



---

## Single Industry Campaign Summary Report

March 1997 – May 1999

July 1999

Publication No. 99-16

 *Printed on Recycled Paper*

# Ship Shape

---

## Single Industry Campaign Summary Report March 1997 – May 1999

Prepared by:

Paul Stasch and  
Donna Lynch

Washington State Department of Ecology  
Water Quality Program

July 1999  
Publication No. 99-16



*Printed on Recycled Paper*

For additional copies of this document, contact:

Department of Ecology  
Publications Distribution Center  
PO Box 47600  
Olympia WA 98504-7600

Telephone: (360) 407-7472

*The Department of Ecology is an equal opportunity agency and does not discriminate on the basis of race, creed, color, disability, age, religion, national origin, sex, marital status, disabled veteran's status, Vietnam Era veteran's status or sexual orientation.*

*If you have special accommodation needs or require this document in an alternative format, please call Donna Lynch at (360) 407-7529. The TDD number is (306) 407-6006. E-mail can be sent to [dlyn461@ecy.wa.gov](mailto:dlyn461@ecy.wa.gov).*

# Table of Contents

---

<i>Executive Summary</i> .....	<i>1</i>
<b>Introduction – Campaign Selection and Scoping</b> .....	<b>5</b>
<i>General Boatyard NPDES Permit Renewal and Compliance Assistance</i> .....	<i>7</i>
Results .....	9
<i>In-Water Hull Cleaning Environmental Advisory</i> .....	<i>13</i>
<i>Marina Technical Assistance</i> .....	<i>17</i>
Results .....	18
Bilgewater/Fueling.....	19
Hazardous Waste .....	20
Used Oil.....	22
Sewage .....	22
Spill Prevention.....	24
Exotics .....	24
<b>Bottom Paint Alternatives</b> .....	<b>25</b>
<b>Best Management Practices for Anti-Fouling Paints</b> .....	<b>30</b>
<b>Vacuum Sander Total Cost Assessment</b> .....	<b>31</b>
<b>Related Activities</b> .....	<b>32</b>
<b>Outreach</b> .....	<b>33</b>
<b>Timeline</b> .....	<b>35</b>
<i>Table 1 Boatyard Survey Results</i> .....	<i>39</i>
<i>Table 2 Marina Checklist Data and Survey Results</i> .....	<i>40</i>
<i>Table 3 Marina Survey Results</i> .....	<i>43</i>
<i>Table 4 Bottom Paint Lifecycle Analysis</i> .....	<i>44</i>
<b>Attachment A – Draft Environmental Advisory</b> .....	<b>47</b>
<b>Attachment B – Final Environmental Advisory</b> .....	<b>49</b>
<b>Attachment C – Used Oil Interim Policy</b> .....	<b>51</b>
<b>Attachment D – Vacuum Sander Total Cost Assessment</b> .....	<b>53</b>

*Cover Photo: Commercial fishing is a vital element of the Pacific Northwest economy.  
(Photo by Paul Stasch)*

# Acknowledgements

---

I would like to take this opportunity to thank the many people who helped make the Ship Shape campaign a success. Without their contributions, the campaign objectives could not have been accomplished and the waste management practices of marinas, boatyards, and commercial divers could not have been improved to the extent they were.

Greg Cloud, John Drabek, Bob Newman, and Bob Fitzen of Ecology; Cynthia Hickey of King County; and Pat Buller-Pearson of the Puget Soundkeeper Alliance all deserve exceptional credit for their efforts in assisting the boatyard owner/operators to understand the new requirements of the reissued General Boatyard National Pollutant Discharge Elimination System (NPDES) permit.

I would also like to extend my heart-felt appreciation to Tammi Allen of the Department of Natural Resources for her positive attitude and amazing persistence during the negotiations of the environmental advisory for in-water hull cleaning. Thank you for making possible what everyone else said would not happen.

The hard work of the many Ecology technical assistance providers must also be acknowledged. Alice North, Rolfe Parsloe, James DeMay, Steve Hood, Andrew Craig, Patricia Jatczak, Laura Schleyer, Tom Boucher, Scott Lamb, Miles Kuntz, Chuck Mathews, Dee Williams, Dick Granberg, Dave Williams, and Harry Johnson deserve special recognition for toiling long hours in the hot summer sun during their trips to the San Juan Islands, the shores of Lake Chelan, and Hell's Canyon. It was more than a job, it was an adventure.

The on-site technical assistance visits to marinas could not have been completed without the valuable contribution from our partners in local government. Elizabeth McClouskey of Kitsap County; Gerald Tousley of Thurston County; Jim Mansfield of Clark County; Jerry Mingo of Island County; Scott Berbells of Pacific County; Dan Watts of Pierce County; Mike Smith of the City of Tacoma; Tom Moore of Mason County; and, Phil Wyman, Kristy Waddell, Lee Dorigan, Sue Hamilton, and Rosemary Byrne of King County, all contributed greatly to the success of this campaign.

I would also like to thank Mary "PIO" Getchell and Tim Gates of Ecology for their fine work "getting the word out" about the Ship Shape campaign and tracking the progress. It is a great feeling to know you have their kind of professional support backing you up.

As a result of your collective effort, the water quality of our lakes, rivers, streams and marine waters has improved and the environmental awareness of boaters and the marine community has risen. This was a great project, thanks for the memories.

*Paul Stasch  
Department of Ecology  
Water Quality Program*

# Executive Summary

---

In the spring of 1997, the Washington State Department of Ecology (Ecology) selected boatyards and marinas as the first agency-wide single industry campaign. All media programs dedicated resources to a multi-disciplinary team lead by a representative of the Water Quality Program. The team was further strengthened by participation from local government, Northwest Marine Trade Association, Puget Soundkeeper Alliance, and tribal representatives. Compliance assistance with the newly reissued National Pollutant Discharge Elimination System (NPDES) permit was extended to the permitted boatyards. Educational outreach and technical assistance was provided to marinas throughout the state. This joint effort was christened the “Ship Shape” campaign. All 130 boatyards and 200 marinas in Washington State received on-site visits.

Boatyards have made large capital investments to prevent or reduce pollution and to lessen the impacts of their operation on the environment. The new permit no longer allows the discharge of pressure wash wastewater directly into our lakes, rivers and marine waters. The wastewater is either recycled or discharged to a municipal sewage treatment plant. Concerns remain about the quality of the stormwater leaving the facilities. Copper concentrations in stormwater remain high. These high concentrations can harm aquatic life, particularly our declining runs of salmon. If the copper loadings to the environment do not decrease, it is likely Ecology will impose stormwater discharge limits (effluent limitations) when the permit is renewed in the year 2002.

Based on the post on-site visit survey, ninety-six percent of the permittees felt the compliance assistance visit was helpful, rating it between very good and excellent. Ninety-seven percent of the permittees believed they had a better understanding of the permit. The new permit increased stormwater sampling from once annually to four times a year. The on-site visits resulted in the stormwater sampling location being changed to a more representative location at 35 percent of the facilities. This means in the first term of the permit, these facilities were sampling in the wrong location for obtaining the most accurate monitoring results. Despite our compliance assistance, in the first year of the new permit, 31 percent of the 130 permitted boatyards failed to submit monitoring results from one or more of the four required reporting periods.

Some tribes and the U.S. Coast Guard are conducting boatyard activities. Since the state of Washington has not been delegated NPDES permitting authority for federal facilities, tribal and federal boatyards in the state are operating without a state permit. The U.S. Environmental Protection Agency (EPA) should consider permitting these facilities for the sake of equity and improved water quality.

When Ecology issued the draft boatyard permit in August 1997, the agency proposed to extend permit coverage to commercial divers. Comments received during the public comment period did not support the proposal. As a result, permit coverage was not extended to divers, instead Ecology jointly issued an Environmental Advisory with the Washington State Department of Natural

Resources. Despite the issuance of this advisory, it is likely that the U.S. Navy will continue the practice of in-water hull cleaning of Navy vessels while afloat in our coastal waters.

Many boatyard operators consider the lack of an outright prohibition on the practice of in-water hull cleaning, an issue of inequity. When the boatyard permit comes up for renewal in the year 2002, in-water hull cleaning is likely to again surface as a contentious issue. The fact is, whether a diver cleans a vessel's hull or not, that vessel is releasing approximately seven and a half pounds of copper each year into the environment. This means that at some of our larger marinas up to four tons of toxic copper could be released within the confines of the breakwater annually. However, there are some paints that release less copper than others and there are commercially available alternatives that release no copper at all.

The marina portion of the campaign differed from the boatyard segment because it did not have a major regulatory component. Therefore, the marina's involvement was completely voluntary and our team's assistance purely technical in nature. Ecology convened an external advisory workgroup in the fall of 1997 to assist us in deciding which environmental topics to address during the campaign. These topics were bilgewater, fueling, hazardous waste and used oil management, sewage, spill prevention, and exotic species. Then a comprehensive resource manual was published, providing detailed information on how best to manage wastes generated by boaters and ways to prevent pollution. The Ship Shape team distributed the resource manual during the on-site visits which began in May 1998.

In addition to distributing the manuals, the Ship Shape team used the on-site visits to collect baseline data on the waste management practices of marinas. Then, Ecology conducted a telephone survey of 25 percent of the marinas to assess any increase in environmental awareness and behavioral change as a result of the on-site visits. Data were compiled for both public and private marinas.

Based on the survey results, 98 percent of the marinas found the resource manual useful with a rating of very good. Ninety-two percent of the marinas reported the on-site technical assistance visit useful with a rating of very good. Sixty-eight percent of marinas made operational changes within their marina as a result of the manual or on-site visit.

The most concerning finding during the visits was the lack of preparedness for spill events. Only 69 percent of marinas had any kind of spill response materials available and only 57 percent conducted training for their staff. The survey indicated that after on-site technical assistance 68 percent of the marinas felt they were better prepared to respond to a spill.

Ecology recently sent a letter to one facility, requiring bioassay testing of the sludge generated from the treatment of the pressure wash waste water. The sludge failed the test and is fully regulated under the provisions of the State Dangerous Waste Regulations, Chapter 173-303 WAC. Ecology has not yet notified other facilities that their sludge is also likely to fail the test. The vacuum sander residue is another wastestream that in all probability will fail this designation test. This means that

the two major wastestreams at our permitted boatyards are likely being mismanaged. This issue needs to be resolved on an industry-wide basis.

Bilgewater has been a high volume problem waste for years. Marinas have been reluctant to provide infrastructure for managing it because the regulatory status of bilgewater has been unclear. During the course of the Ship Shape campaign, Ecology issued a formal position statement that bilgewater could be managed consistent with the Used Oil Interim Policy published in the State Register in October 1998. The position statement clarifies Ecology's intention to use the used oil management standards for managing bilgewater. This means the uncertainty in regards to the regulatory status of bilgewater has been virtually eliminated and a major impediment to the proper management of bilgewater has been removed.

Three additional issues have emerged from this campaign that deserve attention from Ecology for the sake of both the environment and equity. These issues were first raised by our advisory workgroup, identified by facility personnel during the on-site visits and raised again during the telephone surveys. They are sewage discharge, topside cleaning, and slipside maintenance. The United States Coast Guard has the predominate role in regulating the discharge of sewage from vessels, however enforcement has been lacking. Local government has also struggled with the boat sewage issues. The Bremerton-Kitsap County Health District has been trying to adopt their Marina Sewage Control Regulations for years.



*Topside cleaning of vessels with detergents and cleansers was not addressed during the Ship Shape campaign. (Photo by Paul Stasch).*

Ecology should take a more active role in controlling sewage discharges from boats, particularly the discharge of greywater and the discharge of blackwater from liveaboards anchored in embayments with little tidal flushing.

A clear agency policy on the use of detergents and other cleansers for topside cleaning should be developed. Finally, the limitations on slipside maintenance by marine contractors and commercial fishermen should be clearly articulated to marinas so they know when water quality permitting requirements are triggered.

The boating industry has continuing needs for educational outreach, as well as a strong regulatory presence from Ecology. The progress achieved in developing strong working relationships with the various stakeholders, and the investment made establishing trust during the campaign, should be preserved. Ecology should identify a single point of contact for boating related environmental concerns. All the outreach and technical assistance provided to the boating community during the campaign and described in this report, came at a cost of less than three full time equivalents (FTEs).

## Introduction – Campaign Selection and Scoping

---

The Washington Department of Ecology has, in recent years, de-emphasized the typical command-and-control approach to compliance and adopted a new approach emphasizing partnership and collaboration. Starting in 1992, Ecology began a series of non-regulatory technical assistance campaigns with various industrial sectors such as photoprocessors, auto repair shops, dentists, and drycleaners. These campaigns have come to be known as single-industry campaigns and have largely been selected unilaterally by one media program with varying levels of participation from other programs. This approach had some workload implications since the other programs were not involved with the planning of the campaigns. In the spring of 1997, this problem was alleviated by the adoption of a process to select the first agency-wide single industry campaign. The process called for the submittal of proposals by each program. Proposals were submitted on April 22, 1997. Ecology's program managers then met to evaluate the merits of each proposal and select the most appropriate one. Each program manager agreed to commit the appropriate level of resources necessary for the completion of the campaign.



*Boating is an important aspect of life in Washington State. (Photo by Paul Stasch)*

The Water Quality Program proposed boatyards and marinas to the selection committee in May. The Air Program submitted hospitals and the Hazardous Waste and Toxics Reduction Program submitted metal fabricators. Boatyards and marinas were selected because of the large number of facilities, the immediate impact on the environment, significant multimedia aspects, and the fact that the General Boatyard NPDES Permit was being renewed at the time of the selection.

Because of the permit renewal, this campaign was different than previous campaigns. The campaign had a significant compliance assistance component in addition to the typical non-regulatory technical assistance approach. As in the past, the primary goal of campaigns was to visit the majority of facilities across the state to provide tailored on-site facility specific technical assistance. But from the onset, due to the different environmental concerns between boatyards and marinas, the campaign proceeded along separate tracts, one for the permitted boatyards and one for non-regulated marinas. For the sake of consistency, the same individual managed both tracts.

# General Boatyard NPDES Permit Renewal and Compliance Assistance

---

The first General Boatyard NPDES Permit was issued in 1992 with an expiration date of November 1997. The renewal process was initiated in March 1997 to ensure that the permit would be reissued in a timely fashion. An advisory workgroup was formed to provide input to Ecology on a number of controversial issues relating to the regulation of boatyards. These issues were enhanced stormwater monitoring, cessation of the discharge of pressure wash wastewater to surface waters, and commercial in-water hull cleaning. The advisory workgroup consisted of the following people:

<u>Name</u>	<u>Affiliation</u>
Pat Buller-Pearson	Puget Soundkeeper Alliance
Greg Cloud	Department of Ecology
Tim Curry	Canal Boatyard
John Drabek	Department of Ecology
Neil Falkenburg	West Bay Marine Services
Kevin Fitzpatrick	Department of Ecology
David Gruye	Oceanus
Phil Hertzog	Department of Natural Resources
Paul Miller	Miller and Miller Boatyard
Bill Moore	Department of Ecology
Don Olmsted	Port of Edmonds
Phil Riise	Seaview Boatyard
Lynn Schroder	Northwest Marine Trade Association
<b>Paul Stasch - Lead</b>	<b>Department of Ecology</b>
Bruce Stammer	Pacific Diving
Cynthia Wellner	King County Industrial Waste
Dave Williams	City of Oak Harbor

The advisory workgroup met on two occasions in Ecology's Northwest Regional Office. These meetings were held on March 21, 1997 and May 13, 1997. Based on the discussions during the meetings, it was decided to broaden the discussion by transmitting issue papers directly to boatyard permittees on June 5, 1997 to solicit additional input. A limited number of comments were received. The newly drafted permit proposed a number of changes. 1) It eliminated the possibility of direct discharge of pressure wash wastewater. Instead it required closed-loop recycling or indirect discharge to a municipal sanitary sewer system. 2) It also increased the stormwater monitoring from once per year during the "first flush" to four times a year; twice during the spring heavy maintenance period, and twice in the fall after the prolonged summer dry season. 3) The draft permit also proposed to extend coverage to commercial divers conducting in-water hull

cleaning by converting the voluntary recommendations in the In-Water Hull Cleaning Guidelines, developed in 1994, into enforceable permit conditions.

Public notice of the draft General Boatyard NPDES Permit was in August of 1977 in the State Register and 20 newspapers in general circulation in western Washington. The Northwest Marine Trade Association sponsored a public workshop with Ecology presenting the changes to the permit on September 10, 1997 prior to the public hearings on the draft permit. The workshop was well attended by permittees and commercial divers were also represented.



***The General Boatyard NPDES Permit requires commercial boatyards to implement best management practices. (Photo by Paul Stasch)***

Public hearings for the draft permit were held on October 7, 1997 in Everett and on October 8, 1997 in Tacoma. Each of the hearings were preceded by a public workshop to answer questions and clarify Ecology's rationale for the proposed changes. The public comment period ended October 10, 1997. Both written comments and oral testimony received during the public comment period were strongly opposed to

extending coverage to commercial divers conducting in-water hull cleaning. Based on this overwhelming negative comment, Ecology decided to withdraw the

proposal and denied permit coverage to commercial divers. The issue of commercial in-water hull cleaning is discussed in greater detail later in this document. The general permit was signed by Megan White, Program Manager of the Water Quality Program, on December 8, 1997 and noticed in the State Register on January 16, 1998. A more complete accounting of the permitting process is documented in Ecology Publication #97-25, Responsiveness Summary for the General Boatyard NPDES Permit.

After the permit was signed, planning for the compliance assistance aspect of the campaign began. The objective was to visit all permitted facilities, review stormwater sampling locations to make sure representative samples were being collected, and familiarize the permittees with the new permit requirements – particularly the new stormwater monitoring requirements. Since the first round of the new stormwater monitoring requirements had to be collected during May, all permitted facilities were to be visited before May 1, 1998.

Compliance with the stormwater sampling requirements during the first term of the General Boatyard NPDES Permit was less than adequate. The lack of the sampling by some facilities resulted in penalties being issued out of Ecology's Southwest Regional Office. During settlement negotiation of the penalties, a percentage of the penalty monies were diverted from the State

General Fund and into an innovative settlement. These monies were used to fund a series of boatyard permit workshops for permittees. These workshops were sponsored by the Puget Soundkeeper Alliance. The workshops were scheduled to occur during the winter before the on-site compliance assistance visits began. It was believed permittees would be less likely to attend if they had already received their visit. The strategy was to expose the permittees to the environmental messages multiple times.

The workshops were held in Seattle on February 19, 1998, Anacortes on March 5, 1998 and Olympia on March 19, 1998. Representatives of approximately 50 percent of the 130 permitted facilities voluntarily attended the workshops. After the series of workshops had concluded, the on-site compliance assistance visits began in earnest with the majority concluded by May of 1998. It is estimated that 92 percent of the permitted boatyards were visited by Ecology field staff. In addition, two tribal boatyards were also visited and provided courtesy copies of the permit.

## Results

Nine months after the on-site technical assistance visits had been completed, a random telephone survey of 25 percent of the permitted boatyards was conducted. These boatyards were asked a series of standardized questions. It was felt that a sampling of 25 percent would provide representative results. Since Ecology knew 49 percent of the permitted boatyards sent staff to the permit workshops, we used the question, "Did you attend one of the permit workshops?" to groundtruth this assumption. The survey results indicated that 47 percent attended the workshops. Therefore, these survey results are considered valid. The results of the survey are tabulated in Table 1.

A number of findings are of particular interest. Ninety-six percent of the permittees thought the on-site compliance assistance visit was helpful. These permittees gave the visits an average rating of 4.4\*.

*Of Interest:* Eighty-seven percent felt they had a better understanding of the permit than the previous version. Because compliance with the monitoring requirements from the first term of the permit was less than acceptable, the primary focus of the on-site visits was to provide a detailed explanation of sampling methodology and the new monitoring requirements. Ninety-seven percent of the permittees responded that they had a better comprehension of these provisions of the permit. Especially encouraging is the on-site visits resulted in a new, more representative sampling location being established for stormwater monitoring at 35 percent of the facilities. The new permit also added a reporting requirement for zebra mussels, an exotic specie that has not yet been introduced into this state. Following the on-site visits 94 percent of permittees felt they could identify a zebra mussel if they encountered one in their boatyard.

---

\*1 is poor, 2 is fair, 3 is good, 4 is very good, and 5 is excellent

After the on-site compliance assistance visits were completed, Ecology looked at the discharge monitor report (DMR) data to assess the rate of compliance with the monitoring requirements of the new permit. Overall, a total of 31 percent of the permitted boatyards did not collect, or failed to submit, one or more required sample results. While this number seems unacceptably high, there is no way to tell what the compliance rate would have been if the compliance assistance had not been provided. Initially, comparisons to the compliance rate with the first term of the permit were contemplated, however, it was felt that the two permits were significantly different and that comparisons of this nature were invalid.

The way the permit was structured has resulted in some difficult implications. Since permit coverage is required for those facilities that conduct extensive vessel maintenance (i.e., maintenance on greater than 25 percent of the vessel), marinas that allow this kind of work are subject to full permitting requirements. This is particularly true of those marinas with a high percentage of commercial vessels.



***Slipside maintenance of vessels can transform a marina into an unpermitted boatyard. (Photo by Eric Olsson, Washington SeaGrant)***

Commercial fishing crews are hired before the official fishing season. These crewmembers are paid shares based on the catch of the boat after it has been off loaded to a buyer or processor. It is typical for the crew to be expected to conduct routine maintenance on the boat prior to departure to Alaskan waters in the spring. With the vessel berthed in its moorage and the free labor of the crew available, slipside maintenance is common. In this way, the fishing vessel owner is able to reduce costs associated with hauling the boat out in a permitted boatyard. Unfortunately, this type of extensive maintenance, particularly on the outside of the vessel, requires the vessel owner and/or marina to apply for and receive a permit from Ecology.

Old, well entrenched practices die-hard. In Fishermen's Terminal, operated by the Port of Seattle, it was a routine occurrence for hundreds of boats to be welded, scraped, sanded, and painted simultaneously during the month of May with much of the work being conducted from floats and/or dinghies. Fishermen are known for their rugged independence and it is very difficult for marina owner/operators to effect a change in behavior without an inordinate amount of effort. Much of the maintenance that occurs is deferred

maintenance which has been put off until the last minute when the crew has been hired. By then, it is too late to even schedule a haulout at a permitted yard. The answer lies in planning ahead to schedule annual maintenance before the preseason rush. Slipside maintenance remains a substantial environmental problem in the coastal waters of our state.

During the course of on-site visits to permitted boatyards on the coast, it was noted that there are perhaps four U.S. Coast Guard stations that are likely conducting boatyard activities without a permit. Ecology has not been delegated NPDES permitting authority for federal facilities. This permitting authority remains with the U.S. Environmental Protection Agency (EPA), and EPA has not permitted any of these facilities. As recently as April 1999, two out-of-state consultants have contacted Ecology to inquire about the use of hydrofluoric acid with a pH of less than one to clean Coast Guard vessels at sea. This indicates the need for stronger regulation of this segment of the boatyard industrial sector. EPA should issue permits to these federal dischargers.

Another critical issue that needs resolution is the dangerous waste designation of the pressure wash sludges. During the boatyard compliance assistance visits that were conducted in the spring of 1998, the Hazardous Waste and Toxics Reduction Program staff assisting with on-site visits did not address the question of designating the sludges. In April of 1999, Ecology's Southwest Regional Office sent a letter requiring the Port of Port Townsend to designate their pressure wash sludges via a fish bioassay. This test has not been required of other boatyards to date. The sludges failed the test and were designated as dangerous waste. This is not surprising given the percentage of copper in the sludge and the toxicity of copper to salmonids.

Now that the sludge has been designated, it presents a dilemma for Ecology. The sludges generated at the Port of Port Townsend are no different from the sludges generated by the other 129 permitted boatyards, yet these other boatyards have not been required to test their sludges. Ecology now has reason to believe that all of the sludges will designate as a hazardous waste. Will designation be required uniformly across the industry or will the sludges be presumed to designate unless shown otherwise? A related issue that is equally important is the designation of the vacuum sander dusts. The Water Quality Program has pushed hard for greater use of vacuum sanders in boatyards and marinas to reduce air and water borne pollution. The dusts contained in the vacuums is not fundamentally different from the pressure wash sludges. They both contain a high percentage of particulate copper-based paint residues. If these dusts are tested, it is likely that they too will fail the fish bioassay.

# In-Water Hull Cleaning Environmental Advisory

---



***Commercial divers provide a valuable service, but in-water hull cleaning can accelerate the release of copper into the environment. (Photo by Paul Stasch)***

of dollars in capital expenditures for closed-loop recycling systems to collect and treat their pressure wash wastewater. The environmental community and the Department of Natural Resources (DNR) expressed their concerns about the environmental impacts on surface water and sediment quality from the practice, if permitted by Ecology.

Ecology has struggled with how best to manage the practice of in-water hull cleaning since the early 1990s. From that time until the present, boatyards, Northwest Marine Trade Association, and environmental groups have been critical of our lack of clear policy. Prior to the General Boatyard NPDES Permit expiring in November of 1997, an external advisory workgroup was established in March of that year to help frame the contentious issues. From the start, commercial in-water hull cleaning was identified as a major area of concern for the permittees. This was largely because of equity issues not resolved when the permit was initially issued back in 1992.

In an attempt to reduce inequity, Ecology proposed to cover commercial divers in the draft permit by converting the voluntary best management practices in the in-water hull cleaning guidelines, developed in 1994, into enforceable permit conditions. However, this proposal was criticized during the public comment period as unfair to the boatyards that had invested tens of thousands

Based on the largely negative public comment, Ecology decided not to extend permit coverage to commercial divers when the permit was renewed in December 1997. By denying permit coverage, Ecology had little choice other than develop a strong policy statement. Together with DNR, Ecology developed and issued a draft environmental advisory on March 6, 1998. This advisory clarified the legal requirements for commercial operations discharging pollutants into waters of the state and discussed the water quality data available to the agencies at the time of issuance. This data documented exceedances of the surface water quality criterion for copper when a vessel's hull is cleaned in-water. Ecology cannot permit an operation whose discharge has a reasonable potential to violate water quality standards; therefore, the advisory also discontinued our diver registration program and withdrew all support for the practice of in-water hull cleaning. A copy of the draft advisory is provided as Attachment A.

The advisory was mailed to registered divers and dive shops throughout the state and a press release issued to notify the general public that Ecology was opening a 15-day public comment period, even though the state was under no legal obligation to do so. The advisory was covered extensively by the television, radio, and print media. Due to the large number of comments and legislative inquiries, the comment period was extended an additional sixty days. Nearly 400 written responses were received, along with many verbal comments. Seventeen different legislators made inquiries to the agency, some multiple times.

Despite the fact Ecology specifically requested commentors to submit new information regarding the impacts in-water hull cleaning presents to the environment, virtually no new information of this nature was submitted. What was submitted, unexpectedly, was information on the wide spread use of commercial divers to clean ship hulls and propellers at ports throughout the state. Divers reported using both mechanical and hydraulic devices to assist them. They view this practice as an essential means to reduce fuel consumption on transoceanic voyages. Information was also provided about the U.S. Navy's use of divers to prepare the hulls of vessels for combat readiness prior to shipping out. This is particularly concerning given that U.S. Navy vessels have been excluded from the prohibition on the use of tributyltin bottom paints\* and the fact that much of this work is occurring in places on the Superfund National Priority List (NPL), such as the Bremerton Naval Shipyard. The Shipyard was placed on the NPL, largely because of sediment contamination. If this is true, then the U.S. Navy divers are continuing to add to the existing body of sediment contamination.

EPA and the U.S. Department of Defense have begun a process to deal with pollutants discharged from Armed Forces vessels. The Uniform National Discharge Standards are being developed through a joint rule-making procedure. The proposed regulation has identified 25 separate discharges that will require pollution control. In-water hull cleaning is one of the discharges identified as requiring control. During Phase II of the rulemaking procedure, the appropriate control mechanism, whether equipment or management practice, will be established. Phase III will develop

---

\*The International Maritime Organization has decided to ban tin-base antifouling paints by the year 2003. Any ships already coated prior to the ban must be repainted with a non-tin-based paint by the year 2008.

the implementing regulations. For additional information regarding this rule, contact either of the following individuals:

Greg Stapleton  
U.S. Environmental Protection Agency  
401 M Street, SW  
Washington DC 20460  
(202) 260-0141

David Kopack  
U.S. Navy  
2531 Jefferson Davis Highway  
Arlington, VA. 22242  
(703) 602-3594 ext. 243

By and large, the commentors did not support our position articulated in the advisory, 94 percent voiced their opposition. Only 12 commentors supported the position set forth in the advisory. The majority of the commentors that identified themselves were boat owners who would suffer an adverse economic impact if the advisory was adopted as proposed. The top four comments were:

- ☉ Clean up something else first.
- ☉ Don't believe it is harmful or based on bad science.
- ☉ Will cause an economic hardship on boat owners.
- ☉ Being driven by boatyard economic interests.

After issuance, the draft advisory generated approximately 400 written responses. This greatly exceeds the amount of public comment typically received during the public comment periods for many draft rules and permits. Clearly an advisory, particularly one signed by high level officials, commands attention and carries additional weight. As such, it provided a unique opportunity to raise expectations and encourage people to protect the environment in the absence of an aggressive enforcement presence in regards to managing water quality and administering six million acres of aquatic lands.

It was apparent from the body of public comment that there was a need for a balanced resolution of this issue. In response to the public comment, DNR and Ecology negotiated modifications to the environmental advisory. Cleaning vessels not painted with a metal-based paint is not a pressing environmental problem and should not be restricted. However, with the limited amount of data available to us, it is clear there are certain kinds of anti-fouling paints, particularly the soft paints and those containing tributyltin, that when cleaned in-water do present an increased risk to the environment. The cleaning of these bottom coatings in-water needs to be eliminated to improve the water and sediment quality within our marinas. The final environmental advisory was signed on April 28, 1999. A copy of the advisory and statement of basis is provided as Attachment B.

By allowing commercial divers to continue their operations in accordance with the provisions of the advisory, we maintain a vital link with the boat owners through which to disseminate new information on bottom paints and hull maintenance. It is worthy to note that the advisory generated little in the way of new environmental data, but it has increased environmental awareness of the issue through an open public debate.

# Marina Technical Assistance

---

After marinas and boatyards were selected as the agency's next single industry campaign in May, planning began for the marina portion of our technical assistance effort. Boatyards and marinas were selected as sector-of-the month in Ecology's Hazardous Waste and Toxics Reduction Program's TRU View publication. This helped compile the existing information on this sector and increase awareness of the marine environmental issues throughout the agency. Materials were also collected from Ecology's library and the Internet as resources for the development of the comprehensive resource manual for marina owners/operators.

A draft scoping document was developed on June 18, 1998. This document set up ground rules for the internal Ecology team and the general strategy, with options for providing focused technical assistance. The first internal scoping meeting was held on September 4, 1998. During this meeting a list of potential external advisory workgroup members was developed to help us determine which environmental issues should be addressed during the campaign. The following agreed to participate on the advisory workgroup:

<u>Name</u>	<u>Affiliation</u>
Cynthia Balough	King County Hazardous Waste
Bernard Brady	Department of Ecology
Rosemary Byrne	King County Health
Pat Buller-Pearson	Puget Soundkeeper Alliance
Cheryl Cutshaw	Port of Olympia
Neil Falkenburg	West Bay Marine Services
Sue Hamilton	King County Health
Cynthia Hickey	King County Industrial Waste
Patricia Jatzcak	Department of Ecology
Eric Johnson	Washington Public Ports Association
Harry Johnson	Department of Ecology
Miles Kuntz	Department of Ecology
Scott Lamb	Department of Ecology
Chuck Matthews	Department of Ecology
Eric Olsson	Washington SeaGrant
Julie Rector	Muckleshoot Indian Tribe
Laura Schleyer	Department of Ecology
Garin Schieve	Department of Ecology
Lynn Schroder	Nothwest Marine Trade Association
<b>Paul Stasch - Lead</b>	<b>Department of Ecology</b>
Gerald Tousley	Thurston County Environmental Health
Dona Wolfe	State Parks and Recreational Commission

The advisory workgroup met on three separate occasions and debated the environmental issues to be covered during the campaign. The advisory workgroup decided on bilgewater, fueling, hazardous waste, used oil, solid waste, sewage, spill response, and exotic species as the environmental topics to be addressed during the campaign and named the campaign “Ship Shape.”

Following the conclusion of the advisory workgroup meetings, the internal workgroup began the development of an environmental checklist to collect baseline data during the on-site visits against which to assess behavioral change and the increase of environmental awareness over time. Concurrently, work began on the parallel development of the comprehensive resource manual to be distributed at the time of the on-site visits. Both the checklist and manual were designed to address the environmental topics selected by the advisory workgroup. The workgroup met 10 times between December 1997 and May 1998 to decide issues of form and content of the checklist and manual and plan for the on-site visits.

From the onset of its selection, the campaign was severely resource limited. On December 1, 1997 Ecology applied to the Washington State Parks and Recreation Commission for an educational grant under the provisions of the Federal Clean Vessel Act to offset publication costs of 450 resource manuals. On April 27, 1998 the grant application was approved. The manual was published on May 1, 1999 and entitled, Resource Manual for Pollution Prevention in Marinas, Ecology Publication #98-11. Copies of the manual can be obtained through the Ecology Publication Office. Because of high demand, a second printing of 150 additional manuals was authorized and cost assumed by Ecology.

On May 1, 1998 – the Opening Day of the boating season – the first copy of the manual was distributed to Elliot Bay Marina kicking off the on-site visits. This visit to Elliot Bay Marina also served as a field training opportunity for both Ecology and local government personnel participating in the on-site visits. Formal classroom training on how to properly fill out the checklists, what data to collect, and how to consistently present the resource manual material, occurred on May 12, 1998 in Olympia and May 14, 1998 in Seattle. This training also provided an opportunity to describe all of the administrative procedures for the campaign. Since uniformity of data collection was identified as an area needing improvement during previous campaigns, the training was mandatory for all those conducting on-site visits. In this way it was hoped that data collection would be more complete, data quality would be improved, and a more consistent message to all facilities would be provided. On site visits commenced during May 1998 were to be concluded by September 30, 1998.

## **Results**

The use of the checklist was critical to assessing the current state of waste management within our marinas at the time of the initial visit and evaluating improvements over time. The checklist was also to be used to verify the accuracy of the Washington SeaGrant marina database. The on-site visits commenced on May 1, 1998 and continued through the spring of 1999. The resource manual and other resource materials, such as - key floats, trash bags, exotic aquatic plant brochure, signage, and storm drain stencils - were distributed during the on-site visits. The checklist results are

tabulated in Table 2. Unfortunately, King County did not begin their inspections in earnest until October 1998 and had not completed their on-site visits at the time of the drafting of this report. Therefore, the results presented in Table 2 do not include data from all of the marinas in King County. However, after careful review of the available data, it was concluded that there were no discernable differences between the two data subsets.

Data were analyzed for both public and private marinas to identify any differences in environmental management that could be attributed to ownership. Data were also compiled collectively to provide an overview of the industrial sector as a whole. By and large, marina owner/operators are well informed about environmental issues. After all, the vessels moored in their marinas represent a broad spectrum of potential environmental liabilities. Still there were a number of interesting findings. They are discussed in the order they appeared in the resource manual.

A telephone survey was conducted following the on-site visits to assess any increased understanding of environmental issues. Twenty-five percent of the marinas that received visits were randomly contacted and asked a series of standardized questions about waste management and the campaign in general. The results of the survey are tabulated in Table 3. Ninety-eight percent of the marinas surveyed found the resource manual useful, giving it an average rating of 4.1.\*

*Of Interest:* Ninety-two percent of the marina owner/operators responded that they had read a portion of the manual. The on-site visits were also viewed as worthwhile. Ninety-two percent of marina owner/operators found the on-site visit useful, giving it an average rating of 4.1. Sixty-eight percent of marina owner/operators stated that they made operational changes within their marina as a result of either the resource manual or the on-site visit.

## **Bilgewater/Fueling**

Bilgewater and fueling were identified early on as significant sources of pollution to our surface waters, particularly oils. During fueling, fuel vents can “burp” fuel overboard. Many boaters use the burp as their clue that the fuel tanks have been filled. If the fuel tanks vent onboard, as is the case with some diesel powered boats, then the boat owner is much more careful since having slippery diesel spilled on deck is clearly undesirable. But when the tanks vent overboard, the urgency is diminished.

Overtopping the tank at the fuel stem is also a common occurrence. Because of the large capacity of marine fuel tanks, fuel docks pump fuel at higher rates than at gas stations and the nozzle is often a long way from the supply tanks. Therefore, fuel can spit up out of the fuel stem even after the automatic shut off has been activated. To make matters worse, boat owners some times jam the fuel nozzle in an open position so they do not have to be inconvenienced by having to deploy the trigger themselves.

---

\*1 is poor, 2 is fair, 3 is good, 4 is very good, 5 is excellent

Fortunately, there are two devices that help eliminate these discharges vent whistles and vent cups. A vent whistle can be inexpensively installed by boaters to warn them that their tank is nearly filled. Vent cups can be purchased by the fuel dock operator at a nominal cost and are attached beneath the vent to capture any fuel that spills. Establishing fueling procedures can also reduce unnecessary discharges of fuel. Determining how much fuel a boat owner needs, and then monitoring the fuel pump, will lessen the chance of spills. Providing an absorbent pad to place around the fuel stem when filling the tank will also help eliminate the chance fuel will escape into the environment.

In addition to fuel being released into the bilge during fueling, engine fluids are also inadvertently released when the oil is changed, hydraulic lines break, or radiators leak. Because most boats have an automatic bilge pump to keep the bilge dry and the boat afloat, chemicals can be released if the bilge is not kept clean. Some boat owners use soaps to chemically disperse oils in the bilge. Detergents make the oils disappear from view but do not render them harmless. Some boaters use enzymatic bilge cleaners in hopes of safely breaking down the oils. While these enzymatic bilge cleaners may provide some beneficial effect, the environment in the bilge is rarely conducive to effective treatment.

The checklist data showed a number of interesting things. Only 82 percent of fuel docks supply oil absorbent pads. Absorbent pads should be distributed at all fuel docks as a matter of practice. It is unclear why they are not more readily available. At the time of the on-site visits, 85 percent of marina owner/operators understood that soap should not be used to disperse oil spills and sheens. After the visits, the telephone survey revealed that an understanding of the dispersant restriction had grown to 96 percent. The on-site technical assistance providers did not do as well in getting the message about enzymatic bilge cleaners across to marina owner/operators. The understanding of the limitations of the bilge cleaners increased from 43 percent at the time of the visit to only 46 percent as assessed by the telephone survey.

Bilgewater does remain a problem. Only 12 percent of marinas provide a facility for the management of bilgewater. The regulatory status of bilgewater has been uncertain, and this uncertainty has added to the reluctance of marina owner/operators to accept liability for this wastestream. Ecology's Hazardous Waste Toxics Reduction Program recently took the formal position that bilgewater could be managed as a used oil under the Used Oil Interim Policy published in the State Register October 23, 1998 (See the memorandum dated January 8, 1999 – Attachment A). With its regulatory uncertainty clarified, bilgewater can now be managed in an environmentally proactive manner.

## **Hazardous Waste**

Hazardous waste management was viewed by the advisory workgroup as an area needing improvement and orphaned wastes identified as a persistent problem facing 25 percent of marinas. Hazardous waste tends to collect in dock boxes and boathouses over time. Without proper facilities for the management of hazardous wastes, the risk of improper disposal increases. Since only 13 percent of marinas had facilities for managing hazardous waste, it was hoped that the



*Orphaned wastes remain a big problem at many marinas, costing both time and money to dispose of properly. (Photo by Eric Olsson, Washington SeaGrant)*

campaign could provide better information about hazardous waste and encourage marinas to either provide a facility for consolidation of wastes prior to shipment offsite or sponsor a collection event. Unfortunately, the campaign did not result in any hazardous waste collection events occurring at marinas. This was in part due to a lack of resources to leverage the events, as well as some local governments disqualifying collected wastes from the household waste exemption as promulgated in regulation because they feel a marina is a commercial business. The telephone survey did find that 52 percent of marina owner/operators learned something new about hazardous waste management.

The telephone survey did not attempt to assess how many additional marinas had taken the responsibility for the management of their tenant's hazardous waste. It was felt there was not enough time to construct the proper infrastructure, such as covered storage and secondary containment.

Another important aspect of the campaign was to make marina owner/operators aware that polychlorinated biphenyls (PCBs) and hazardous waste are regulated under two completely separate programs. This was an outgrowth of a large Toxic Substances Control Act (TSCA) penalty issued to a public port authority by EPA just prior to the campaign. The impacts of this penalty will be discussed further in the following section. At the time of the on-site visits, only 47 percent of the marina owner/operators were aware of the difference but, the telephone surveys indicated the awareness had risen to 79 percent as a result of the campaign.

## Used Oil

Used oil is a common problem waste of any industrial sector utilizing internal combustion engines. Marinas, particularly large ones, generate a substantial amount of used oil as a result of routine maintenance of their tenant's vessels. Because used oil is very messy, providing recycling opportunities is a good customer service; still only 40 percent of marinas collect used oil.

What we do know from the on-site visits is that marinas collect an average of 1,000 gallons of used oil per year. Since 60 percent of the 200 marinas visited do not collect used oil, as much as 120,000 gallons of used oil is not being collected by the marinas. It is not possible to determine with certainty how this oil is being managed, but clearly, if this oil was being managed closer to the point of generation, there would be less risk to the environment.

Just prior to the campaign, EPA issued a TSCA penalty of \$41,000 to the Port of Anacortes for the illegal storage of PCB contaminated oil. The port offered used oil collection at the Cap Sante Marina and the oil they collected became contaminated when some PCB oil from an unknown source was disposed of into the collection tank. The used oil was identified by the oil hauler as contaminated, but the driver failed to isolate the contaminated oil. The contaminated oil was then mixed with uncontaminated oil increasing the total volume of TSCA regulated oil.

As a result of the penalty, many public port authorities and the Washington Public Ports Association openly debated whether or not to continue providing used oil recycling services. This was particularly disturbing since 72 percent of public marinas collect used oil. The resource manual was designed to disseminate information on ways to limit the liability associated with used oil collection, such as controlling access to the collection tanks and conducting routine testing of the oil. Information regarding the Used Oil Contingency Fund was also provided. At the time of the on-site visits, only 20 percent of marina owner/operators were aware of the fund. The telephone survey indicated that following the on-site visits; the awareness of the fund had risen to 50 percent. By providing solutions we were able to reduce concerns and did not see a significant number of public marinas discontinue the service. The survey also found that 42 percent of marina owner/operators learned something new about used oil recycling.

## Sewage

Sewage was probably the most difficult issue during the campaign, because many boaters have strongly held beliefs regarding the true environmental impacts of the discharge of sewage. Many boaters and marina owner/operators feel that the problem of fecal coliform contamination lies with other forms of non-point source pollution, such as failing septic tanks and hobby farms. This may account for the fact that only 40 percent of marinas had a procedure to assure that live-a-boards used the sewage pumpouts on a routine basis. (It is interesting to note that 68 percent of marinas actively managed wastes generated by pets.) In fact, only 58 percent of marina owner/operators at the time of the on-site visits could identify one of two major causes of shellfish bed closures: fecal coliform bacteria and red tide contamination. While this result includes responses from eastern

Washington marinas, miles from commercial shellfish bed, the percentage could have been much higher. The telephone survey indicated that the campaign increased awareness of the marina owner/operators so that 81 percent could correctly identify one of the major causes of shellfish bed closures.

The Bremerton-Kitsap County Health District has been trying to adopt sewage control regulations since 1988. Despite proposing an exceedingly reasonable approach for controlling the discharge of sewage within marinas, no consensus with the stakeholders has been reached. These proposed regulations are consistent with the standards for boating facilities in the proposed revisions to the Shoreline Master Program Guidelines expected to be adopted in September 1999. These guidelines require local government to revise their shoreline master programs to adopt regulations to require new, expanded, or reconstructed facilities to limit the impacts from liveaboards and for sewage pumpouts.

An important aspect of this campaign was to make marina owner/operators aware of the federal Clean Vessel Act grant program administered by the Washington State Parks and Recreation Commission. Under this program, 75 percent of the cost of a sewage pumpout could be covered by the grant. At the time of the on-site visit, 67 percent of the marina owner/operators were aware that the grant program existed. The telephone survey indicated that after the visits, familiarity with the program had grown to 98 percent.

A common complaint that was heard from marina owner/operators was that the grant program did not cover the cost of maintenance of the pumpout facilities, such as pumping the septic or holding tank. This is incorrect as the program does allow the marina to charge up to \$5 per pumpout, and that money can be spent on maintenance or replacement of the existing facilities.

One issue that continues to raise questions is the practice of liveaboards that remain permanently anchored in embayments throughout the Puget Sound. It is clear to many of the marina owner/operators that a large number of these vessels on the hook are not using pumpout facilities and are likely discharging sewage directly into state waters. Since many of these bays and harbors have limited flushing, fecal coliform impacts are likely occurring. Eagle Harbor and Liberty Bay are just two examples. As long as there remains a lack of enforcement on sewage discharges of this nature, the regulatory agencies will have a lack of credibility when they recommend that the marinas take action against their liveaboard community. One option that should be considered is the designation of all of Puget Sound, San Juan Islands, and the Straits of Juan de Fuca as a non-discharge zone.



***Liveaboards create a unique set of environmental problems for marinas.  
(Photo by Paul Stasch)***

## **Spill Prevention**

Spill prevention and preparedness was the area where the marinas were weakest. Marinas are the first line of defense against spills, yet only 69 percent had spill response materials available. Only 57 percent conducted any form of spill response training for their staff. Clearly, significant improvements can be made in these two areas.

A total of 69 percent of the marina owner/operators made spill notification telephone numbers accessible to their tenants at the time of the on-site visit. The telephone survey indicated that access to spill notification numbers increased to 81 percent as a result of the campaign. The survey did indicate that the campaign improved the ability of 68 percent of the marina owner/operators to respond to a spill incident within their marina.

## **Exotics**

Marina owner/operators were very well informed about zebra mussels and green crabs, two exotic species threatening our state. At the time of the on-site visit, 65 percent had heard of zebra mussels and 47 percent felt that they could identify them despite the fact that there are none in Washington State at this time. As a result of the campaign, these percentages increased to 90 percent and 79 percent, respectively.

The threat from green crabs to Washington State was not well understood in the spring of 1998 when the checklist was developed. Therefore, the checklist did not include any questions concerning green crabs. Unfortunately, by the summer of 1998, green crabs were positively identified as established in both Willapa Bay and Grays Harbor. The resource manual did include a green crab fact sheet for informational purposes and the telephone survey found that 87 percent of marina owner/operators had heard of green crabs and 60 percent felt that they could identify one. The resource manual also included identification sheets for green crabs and cards for zebra mussels. It is our hope that these materials will be posted at the marinas so the general boating public will become familiar with these two alien invaders.

# Bottom Paint Alternatives

---

From the inception of the Ship Shape campaign, developing and distributing technical assistance information on how to reduce the environmental impacts associated with the use of anti-fouling paints was a specific objective. However, without additional funds for testing, it was hoped that a search of the available literature would help fill data gaps and “discover” less toxic – but still effective – bottom paints. Ecology realized from the start that the regulation of commercial divers would not eliminate the environmental threats from anti-fouling paints. Therefore, it was felt that providing boat owners with the best information available on the toxicity of bottom paints was necessary so they could make informed choices as consumers to better protect water quality. Unfortunately, this task proved much more difficult and expensive than anticipated. A direct mailing to hundreds of thousands of registered boat owners would be cost prohibitive.

Biological fouling has been a problem that has plagued mariners for centuries. Fouling organisms are represented by 13 of the 17 general classes of animal life that biologists call phyla. Molluscs, tunicates, tube worms, barnacles, bryzoans, algae, grasses, and slimes are just a few of the more common examples. These fouling organisms can both increase drag, resulting in added fuel consumption, and cause major structural damage to a vessel’s hull. The severity of fouling depends on the amount of light, temperature, and available nutrients. Once attached, the fouling organisms can only be removed by scraping. Historically, vessels were clad in copper sheets or sheathing to prevent attachment of hard growth or damage by shipworms. Sheathing a vessel in copper is an extremely expensive proposition and not very practical for today’s high performance hulls. Paints have virtually eliminated the use of metallic copper in anti-fouling applications. While anti-fouling paints superficially resemble other paints, it is important to remember they are in fact pigmented pesticides that must be registered by EPA and the Washington State Department of Agriculture.

Early bottom paints used lead as the active ingredient to retard growth. The advent of paints formulated with tributyltin in 1960 resulted in vast improvements in anti-fouling effectiveness. A new standard was achieved however, it wasn’t long before tributyltin’s bioaccumulative, teratogenic and persistent properties became known to the scientific community. Examples of environmental harm to marine biological communities surfaced around the world. Structural deformities in oysters and other molluscs were occurring at the low parts per billion level. In the United States, the Organotin Antifouling Paint Control Act of 1988 severely restricted its use. On March 1, 1990 the U.S. Congress eliminated over the counter sales of tributyltin and its use on vessels less than 82 feet in length.

The elimination of tributyltin use for most recreational boaters resulted in a scramble by paint manufacturers to make the next less toxic anti-fouling paint, while the remaining inventory of tin-based paints were exhausted from the market place. In the past ten years, copper-based paints have risen to the forefront, filling the void.

Copper-based paints typically use cuprous oxide as the active ingredient, although a small amount of paints that use metallic copper powder or flakes are also produced. The effectiveness of the paint at deterring growth and attachment is not determined by the copper concentration but by the release rate. Generally speaking, the more biocide released, the more effective the paint is at inhibiting fouling. However, release rates have to be balanced with durability of the coating and its ability to remain effective over a reasonable period of time. The cost to have a vessel hauled, pressure washed, blocked up in a boatyard, repainted, and returned to the water is substantial. Therefore, if a paint can last for two or even three years, significant savings can be realized. The amount of copper in a paint can give some indication of the longevity of the coating, but even that is determined in part by binder type, water conditions, temperature, boat speed, and frequency of use. The coating eventually fails when the copper concentration in the water layer adjacent to the hull falls below the concentration necessary to prevent attachment.

Most anti-fouling paints fall into two major groups – conventional and soluble formulations; using cuprous oxide as the active ingredient. Metallic paints represent a small percentage of the overall market share of anti-fouling paints used. In addition to anti-fouling paints, there are commercially available non-toxic coatings, as well as other alternatives to reduce fouling.

Conventionals - These paints use diffusion as the mechanism to release the copper biocide. Copper particles are evenly distributed throughout the paint. The copper particles diffuse into the surrounding water, rather than the water dissolving the paint itself. As the particle dissolves, it leaves a cavity that enables the water to penetrate deeper into the paint film. The process repeats itself until the copper is exhausted, creating a tough, hard, smooth shell. Conventionals have copper concentrations as high as 75 percent, however, they lose their effectiveness once pulled out of the water for extended periods of time. If you only have a 4-6 month boating season, then haulout the boat for winter, the expensive long-term conventional paint is not economical.

Epoxies – These “hard” paints cure by oxidation. They work by letting water diffuse through insoluble paint film, releasing copper at a constant rate. It has a hard finish of high durability, good abrasion resistance, and adheres well. Epoxies gradually lose effectiveness when the vessel is stored out of water. The coating is difficult to remove when depleted.

Vinyls – These are another type of hard conventional paint that cures by solvent evaporation rather than oxidation. They have a very smooth, low friction finish with good abrasion resistance. The paint may be scrubbed without damage. Vinyls gradually lose effectiveness when the vessel is stored out of water for prolonged periods of time.

Soluble paints – These paints are also known as self-polishing or soft paints, because the paint binder or matrix itself gradually dissolves exposing the active ingredient. The rate at which the paint dissolves is determined by the chemical composition of the binder as well as boat speed and turbulence. The thickness of the paint coating is the main determining factor in determining how long a paint will last. Soluble paints typically have lower copper concentrations. These are the paints that cannot be cleaned in-water by commercial divers.

Sloughing – These paints have the softest finish and the lowest copper content. They wear quickly and are designed for use on slow boats with displacement hulls. They are inexpensive, easy to apply, and easy to remove. Scrubbing in-water shortens life, and their use typically requires the vessel to be repainted every year. The paint loses effectiveness if the vessel is stored out of water for prolonged periods of time.

Ablatives – These paints work by eroding away at a controlled rate. Multiple coats are necessary for the best performance. Scrubbing in-water shortens life span but is effective as long as there is paint remaining. Not very smooth, therefore, speed is sacrificed. The coating is reasonably easy to apply and easy to remove. Co-polymer ablatives can be hauled for prolonged periods of time and remain effective when relaunched. They are also reasonably easy to sand and remove.

Metallic Paints - The last group of anti-fouling paints, are those which use metallic copper as the biocide. The concept is similar to the copper sheathing used in the past. Copper is present in the binder in either a powder or flake form – usually an epoxy or gel coat resin. The cost of the material is slightly higher than most of the conventional or soluble paints. These coatings are characterized by a long service life and release smaller amounts of copper into surface waters.

Since the copper release rate determines how well a paint deters the attachment of fouling organisms, there comes a point when an excessive release of copper provides no added benefit. To determine release rates, a standardized test had to be developed. When questions regarding the toxicity of tin-based paints arose, the Standard Test Method for Organotin Release Rates of Antifouling Coating Systems in Seawater (ASTM D 5108-90) was adopted. In this test, cylinders are painted with the anti-fouling paint to be tested and rotated in synthetic seawater for one hour at specified intervals. The paint sample is tested for 45 days and the test can cost between \$6,000 and \$8,000. The paint was considered acceptable if the release rate for the tributyltin in the extract calculates out to 4 ug/square cm/day or less.

Now that copper anti-foulants have replaced tin-based paints, ASTM has begun the process of adapting the ASTM D 5108-90 methodology for use in determining copper release rates. This draft standard has a proposed copper release rate of 40 ug/square cm/day. This test will also take 45 days to complete and costs the same amount. Because the test protocol has not yet been agreed upon, most paint manufacturers are reluctant to run a test that costs \$6,000 if the results may be invalidated if the draft protocol changes. Canada has accepted the 40 ug/square cm/day copper standard but does not have an approved protocol either. Because a body of test data does not currently exist, comparison of the release rates across the various brands of paint is impossible.

Regardless of the type of anti-fouling paint used on the vessel, or if the boat owner uses the services of a commercial diver to clean their hull periodically, the result is the same – the majority of the copper either dissolves or diffuses out of the paint and is released into the environment. In a large marina, this means a lot of copper. The copper content of commercially available anti-fouling paints range from 25-75 percent cuprous oxide by weight. A reasonable average of 50 percent can

be assigned. A gallon of bottom paint weighs about 20 pounds. If each vessel needs two gallons of paint to complete the job, then about 20 pounds of cuprous oxide are being applied when the bottom is repainted. With the majority of vessels painted every other year, this means that a marina with a 1,000 slips is releasing upwards of 7,500 pounds of elemental copper\* off the hulls of their tenants' vessels each and every year into waters of the state. The small amount left clinging to the hull is pressure washed off into the closed-loop recycling system in a permitted boatyard.

Non toxic paints – These coatings are comprised of silicone, Teflon, or other proprietary materials. They do not contain a copper biocide and do not repel the attachment of fouling organisms.\*\* Instead, they rely on a super slick or fibrous finish that inhibits attachment through physical means. Many are self-cleaning. This means the water pressure on the hull when the vessel is underway is often sufficient to keep the hull free of growth. However, if the vessel is not used on a routine basis, periodic cleaning by a diver is needed. An added benefit to the use of these coatings is greater fuel efficiency.

Interlux produces a silicone-based paint called Veridian. Until recently, Veridian had to be professionally applied. Now it has been reformulated for use by do-it-yourselfers. At \$300-\$400 per gallon, this paint is expensive, but its extremely smooth finish is claimed to add a knot of hull speed at the same RPMs, translating into a fuel savings of 10-20 percent. A primer, also known as tie coat, will be need if the hull has been previously painted. Longevity has not been firmly established, but is claimed to exceed five years. Interlux can be reached at (908) 686-1300.

Sound Specialty Coatings produces a non-toxic permanent bottom coating called Aquaply M. This too is an easy release coating which growth has difficulty adhering to. This coating can be applied by the boat owner for about \$250 per gallon. Aquaply M is reported to have a service life exceeding 10 years and is guaranteed for five years. Sound Specialty Coatings can be reached at (206) 517-2611.

SealCoat is another non-toxic coating that provides anti-fouling protection through mechanical rather than chemical means. SealCoat is a two-part coating system. The first layer is an epoxy-based barrier coat. The epoxy layer acts as a glue onto which the second layer of synthetic fibers are sprayed. These fibers are electrostatically charged as they are applied. The finished surface has a velvet-like texture whose fibers are in continuous motion like seal's fur when the vessel is relaunched. SealCoat is guaranteed for a minimum of three years. Additional information can be obtained by contacting Seal Coat at (206) 633-3308.

The economics of bottom paints are not frequently understood and are much more complicated than simply the price of the paint. Table 4 compares the relative costs associated with repainting a 35-foot boat with five different types of bottom paints and coating systems. Haulout costs were assigned a rate of \$5.25 per foot. Yard storage was assigned a rate of 75 cents per foot per day.

---

\* Elemental copper represents 75 percent of the weight of cuprous oxide.

\*\* Some Teflon-based paints contain limited amounts of copper.

Hull preparation costs were determined in the vacuum sander total cost assessment discussed in the next section. Paint costs are based on the recommended retail value. The labor costs associated with repainting were considered a wash and not included. For the non anti-fouling coatings, costs for in-water hull cleaning by a commercial diver were assigned at one dollar per foot on a quarterly basis.

Alternatives – As with many other environmental issues, California has been very aggressive in controlling the discharge of copper into their coastal waters. This regulatory pressure has resulted in a creative way to eliminate fouling with hard growth such as barnacles and mussels. Two companies have developed polyethylene slip liners for use in saltwater marinas. The edges of the polyethylene liner are attached to the walkway surrounding the slip. The end of the liner is dropped to allow the boat to enter its moorage space. Once inside, the end is lifted once again and secured above water. Freshwater is then run into the liner to reduce salinity to the point where marina organisms cannot survive. This usually takes a 15-20 minute addition of potable water from the dock hose. One company recommends the addition of chlorine. However, the use of chlorine would not be appropriate in most applications. In-water hull cleaning by divers can be conducted periodically to control algal growth.

The use of slip liners is wide spread in southern California. In the Dana Point Marina between 25-30 percent of slips are lined, yet in Washington State only one liner has been installed. Slip liners are relatively inexpensive, costing approximately \$1,000 for a 35 foot powerboat. The cost for sailboats is slightly more given the additional material required to get beneath the keel. Professional installation will be another \$200. For more information on slip liners contact Armored Hull at (949) 472-3753 or Bottom Liner at (562) 435-0898.

# Best Management Practices for Anti-Fouling Paints

---

Boats are a large financial investment, which give us great pleasure and a sense of freedom found in few other activities. The reality is that despite our best intentions not to pollute our aquatic environment, we will protect that investment. This means that the use of anti-fouling paints will continue. The following tips will extend the life of your bottom paint and reduce the overall impact to the environment.

- ☼ Cuprous oxide is a highly dense pigment that settles to the bottom of the paint can. The paint should be mixed thoroughly to distribute the active ingredient evenly. Mix well before using and occasionally during use.
- ☼ Only apply paint to clean hulls that have been thoroughly prepared. Read the manufacturer's directions on the paint can to properly prepare the hull prior to reapplication. If applying paint over a previous coating, make sure paints are compatible.
- ☼ Do not thin paints with solvents or water. This false economy leads to uneven application that shortens the life of the coating and the end result is premature failure due to inadequate film thickness.
- ☼ Apply paint with a high quality roller when possible. Rollers apply paint more evenly.
- ☼ Never add anything to antifouling paints other than small amounts of suitable paint thinners consistent with the manufacturer's recommendations. The addition of additives will almost certainly upset the critical binder balance and impair the leaching effect of the cuprous oxide. Additives can also lead to blistering and other possible paint failures.
- ☼ Aquatic plants need adequate light to grow, so the fouling by these organisms is greatest at the waterline. Apply an extra coat of paint at the waterline.
- ☼ Apply extra coats of paint in areas of high turbulence, such as bow, rudder, leading edge of keel, stabilizers, trim tabs, and cavitation areas.
- ☼ Try a built-in renewal indicator for ablatives, such as contrasting colors between different coats.

# Vacuum Sander Total Cost Assessment

---

Prior to renewing the General Boatyard NPDES Permit, the stormwater monitoring data for the first five years of the permit was reviewed. The copper concentrations in the stormwater were elevated by as much as four orders of magnitude above the marine water criterion. Faced with the realistic possibility of having to impose effluent limitations, Ecology's internal permit workgroup decided, instead, to impose a more rigorous monitoring program. The group also debated the value of requiring the use of vacuum sanders as a permit condition.

Requiring the use of vacuum sanders in this term of the permit was deferred. However, Ecology began searching for a permitted boatyard that was willing to participate in a pilot project to conduct a total cost assessment on the use of the vacuum sander versus the use of the traditional air rotary tool. It was our hope that we could objectively document a cost savings over the air rotary tool and provide an economic incentive for a yard to convert to vacuum sanding. A secondary objective was to provide information on the environmental benefits of vacuum sanding to marina owner/operators so they would consider making its use a requirement as part of the marina's best management practices for their moorage tenants doing topside work.

In November 1999, Neil Faulkenburg of Westbay Marine Services offered to participate and donate the use of his 32 foot Irwin for the experiment. The vessel was split down the centerline of the keel. One side of the vessel's bottom was prepared with a vacuum sander and the other side prepared with the air rotary tool. All labor and material costs were documented. The project was conducted on December 1&2, 1999, with the assistance of Jeremiah Mitchel of FEIN Power Tools, Inc. The vacuum sander technology was a little slower. This was attributed to the six-inch pad on the vacuum sander versus the eight-inch pad on the air rotary tool. However, material cost savings made up for the difference, resulting in an overall cost savings to the do-it-yourselfer of approximately \$140. This total cost assessment has been published and copies were sent to all permitted boatyards and marinas participating in the Ship Shape campaign. The publication is three-hole punched to fit into the marina manual. A copy has been provided as Attachment D.

## Related Activities

---

In support of the Ship Shape campaign, a number of ancillary activities were undertaken to amplify the environmental messages being delivered and to leverage support. Likewise, it was believed that many of these other efforts could benefit from Ecology's support. Below is a brief synopsis of these activities.

- ◆ Reviewed the Port of Anacortes' "Best Management Practices for Handling Used Oil" for consistency with state regulations and policies. This document was developed as part of the settlement of the EPA TSCA penalty for PCB violations.
- ◆ Participated on Washington SeaGrant's Oil Spill Prevention Advisory Workgroup. This workgroup prioritized technical assistance needs for the education of marinas, commercial fishermen, and recreational boaters in the prevention of oil spills.
- ◆ Participated on the Steering Committee for the National Clean Boating Campaign.
- ◆ Acted as Ecology's technical advisor for the Public Participation Grant awarded to the Puget Soundkeeper Alliance for participation on the National Clean Boating Campaign.
- ◆ Participated in the public process for the adoption of the Bremerton-Kitsap County Health District's proposed Marina Sewage Control Regulations. Submitted a letter of support for the Marina Sewage Control Regulations to the Bremerton-Kitsap County Health District, Environmental Health Division.
- ◆ Assisted the liveaboard association with the development of the water quality plan for the Everett Marina.
- ◆ Participated on the Green Crab and Zebra Mussel Task Force on the Recreational Boater Subcommittee and drafted recommendations to the Legislature.
- ◆ Acted as Ecology's technical advisor for the Public Participation Grant awarded to Citizens for a Healthy Bay (CHB). Assisted in the development of the CHB best management practices video for boatyards.

# Outreach

---

A great deal of effort went into educating boatyard and marina owner/operators about Ecology's Ship Shape technical assistance campaign and to amplify the overall impact of our environmental messages. Information about the campaign was disseminated through various publications, press releases, and a series of presentations. A total of 14 articles were printed in the Northwest Marine Trade Association's (NMTA) WaterLife, Ecology's Confluence, Washington Public Port Association's Member's Letter, and trade periodicals like Norwesting, 48° North, and Northwest Diver News. The environmental advisory received extensive print, radio, and television coverage from the media.

Numerous presentations were made to different boating groups, marine trade organizations, and the general public. These presentations provided updates on the campaign and preliminary results.

## **Presentations**

Waste Information Network – September 17, 1997

Public Workshop sponsored by Northwest Marine Trade Association – September 10, 1997

Marina Boater Task Force – October 9, 1997

Washington Public Ports Association – November 26, 1997

South Puget Sound Marina Owner/Operator Association – December 11, 1997

Moderate Risk Waste Coordinators (MRW) – January-1998

Washington Public Ports Association – January 16, 1998

Public workshop sponsored by Puget Soundkeeper Alliance – February 19, 1998

Oregon Department of Environmental Quality – February 25, 1998

Public Workshop sponsored by Puget Soundkeeper Alliance – March 5, 1998

Public Workshop sponsored by Puget Soundkeeper Alliance – March 19, 1998

Lake Union Association – March 24, 1998

Seattle Yacht Club/Recreational Boaters Association of Washington – April 2, 1998

Seattle Community College Boat Building Program – April 22, 1998

Rainier Yacht Club – May 28, 1998

Association of Independent Moorages – May 21, 1998

Marina/Boater Advisory Committee – May 29, 1998

Southern States Environmental Conference – September 23, 1998

Pacific Coast Congress of Harbormasters – October 21, 1998

Washington Public Ports Association – November 16, 1998

Department of Natural Resources – January 7, 1999

Department of Natural Resources – February 26, 1999

Cordova District Fishermen United – March 18, 1999

Northwest Marine Trade Association – April 14, 1999

Snohomish High School – May 26, 1999

In addition to providing technical and compliance assistance to public and private boatyards and marinas, the Ship Shape campaign provided outreach to many tribal facilities across the state. Since Ecology has no regulatory authority over tribally owned or operated boatyards and marinas, technical assistance was provided purely as a courtesy. Copies of the General Boatyard NPDES Permit and/or marina manual were provided to the Swinomish, Makah, Puyallup, Quileute, Spokane, and Colville Tribes. The tribal boatyards visited would have been exempted from permitting as totally-enclosed facilities or were following the substantive requirement of the permit as a matter of practice. Chinook Landing and the marina in Neah Bay are two state-of-the-art facilities in the state.

# Timeline

---

## 1997

---

### March

March 21, 1997 First meeting of Boatyard external advisory workgroup.

### April

April 22, 1997 Single-industry selection committee meeting of Ecology Program Managers.

### May

May 1997 Ecology Program Managers select Boatyards and Marinas as agency's first single-industry campaign.

May 13, 1997 Second meeting of the Boatyard external advisory workgroup.

### June

June 1997 Boatyards and marinas selected as TRU View's sector-of-the-month.

June 5, 1997 Issue papers sent to Boatyard Permittees.

June 18, 1997 Draft scoping document developed for the single-industry campaign.

### August

August 19, 1997 Draft General Boatyard NPDES Permit noticed in State Register and published in 20 newspapers.

### Septemeber

September 4, 1997 First meeting of the Ship Shape campaign internal workgroup.

September 10, 1997 Public workshop sponsored by Northwest Marine Trade Association (NMTA) to discuss proposed changes in the draft boatyard permit.

September 17, 1997 Presentation at the Waste Information Network's annual conference of the Ship Shape campaign.

September 29, 1997 First meeting of the Ship Shape external workgroup.

### October

October 7, 1997 Public workshop and public hearing on the Draft General Boatyard NPDES Permit in Everett.

October 8, 1997 Public workshop and public hearing on the Draft General Boatyard NPDES Permit in Tacoma.

October 9, 1997 Second meeting of the Ship Shape external workgroup.

October 9, 1997 Presentation on the Ship Shape campaign to the interagency Marina/Boater Task Force.

October 10, 1997 Public comment period for Draft General Boatyard NPDES Permit ends.

## **November**

- November 17, 1997 Second meeting of the Ship Shape internal workgroup.  
November 26, 1997 Briefed the Washington Public Ports Association on the Ship Shape campaign.

## **December**

- December 1, 1997 Grant proposal submitted to the State Parks and Recreational Commission for publication of the marina manual.  
December 4, 1997 Third meeting of the Ship Shape external workgroup.  
December 8, 1997 General Boatyard NPDES Permit signed.  
December 11, 1997 Presentation to South Puget Sound Marina owner/operators on the Ship Shape campaign.  
December 12, 1997 Third meeting of the Ship Shape internal workgroup.  
December 17, 1997 Formal training for the boatyard compliance assistance visits held at NWRO.

## **1998**

---

### **January**

- January 8, 1998 Fourth meeting of the Ship Shape internal workgroup.  
January 14, 1998 Timeline established for the Ship Shape campaign.  
January 16, 1998 Presentation of the Ship Shape campaign and the General Boatyard NPDES Permit to the Washington Public Ports Association.  
January 16, 1998 General Boatyard NPDES Permit noticed in State Register.  
January 20, 1998 Fifth meeting of the Ship Shape internal workgroup.  
January 29, 1998 Orientation visit for Ecology staff to Port of Seattle marina facilities.

### **February**

- February 3, 1998 Sixth meeting of the Ship Shape internal workgroup.  
February 11, 1998 Presentation to the MRW Coordinators on the Ship Shape campaign.  
February 18, 1998 Communication strategy developed for the environmental advisory on in-water hull cleaning.  
February 19, 1998 Seventh meeting of the Ship Shape internal workgroup.  
February 19, 1998 Boatyard permit workshop held in Seattle.

### **March**

- March 4, 1998 Eighth meeting of the Ship Shape internal workgroup.  
March 5, 1998 Boatyard Permit Workshop held in Anacortes.  
March 6, 1998 Draft environmental advisory for in-water hull cleaning issued.  
March 19, 1998 Boatyard permit Workshop held in Olympia.  
March 23, 1998 Ninth meeting of the Ship Shape internal workgroup.  
March 24, 1998 Presentation to Lake Union Association on the Ship Shape campaign.

## **April**

- April 2, 1998 Presentation to Recreational Boaters Association of Washington on the Ship Shape campaign.
- April 22, 1998 Presentation to Seattle Community College Boat Building Program on the General Boatyard NPDES Permit.
- April 1998 Presentation to State of Oregon DEQ on the General Boatyard NPDES Permit.
- April 27, 1998 State Parks awarded \$5,000 grant for the publication of the marina manual.
- April 27, 1998 Meeting with Senator Haugen and constituents regarding environmental advisory.

## **May**

- May 1, 1998 Opening Day of Boating Season and orientation visit for non-Ecology staff at Elliott Bay Marina. On-site visits begin.
- May 4, 1998 Tenth meeting of the Ship Shape internal workgroup to plan formal training for on-site visits.
- May 12, 1998 Formal training for on-site visits held in Olympia.
- May 14, 1998 Formal training for on-site visits held in Seattle.
- May 21 1998 Presentation to Association of Independent Moorages on the Ship Shape campaign.
- May 28, 1998 Presentation to Rainier Yacht Club on the Ship Shape campaign.
- May 29, 1998 Presentation to Marina/Boater Advisory Committee on the Ship Shape campaign.

## **June**

- June 2, 1998 On-site training to Fishermen's Terminal for King County staff.
- June 4, 1998 Press release issued for Ship Shape campaign.

## **July**

- July 23, 1998 Meeting with Dave Tagert regarding environmental advisory.

## **August**

- August 12, 1998 Last meeting of the Ship Shape internal workgroup.

## **September**

- September 23, 1998 Presentation at Southern States Environmental Conference on environmental advisory.

## **October**

- October 21, 1998 Presentation to Pacific Coast Congress of Harbormasters on the Ship Shape campaign and environmental advisory.
- October 27, 1998 Presentation to the Port of Seattle at Fishermen's Terminal on the General Boatyard NPDES Permit.

**November**

November 16, 1998 Presentation to Washington Public Ports Association on the Ship Shape campaign.

**December**

December 1-2, 1998 Vacuum Sanders Total Cost Assessment conducted.

December 1998 Marina environmental checklist data compiled.

**1999**

---

**January**

January 1999 Telephone surveys of boatyards conducted.

January 7, 1999 Presentation to DNR regional staff on the environmental advisory.

**February**

February 1999 Telephone surveys of marinas conducted.

February 24, 1999 Communication Strategy for environmental advisory updated.

February 26, 1999 Presentation to DNR Land Managers on Ship Shape campaign results.

**March**

March 18, 1999 Presentation to Cordova Fishermen's Union on Marina Best Management Practices.

March 25, 1999 Presentation to Association of Independent Moorages on the Ship Shape campaign results.

**April**

April 14, 1999 NMTA stormwater sampling seminar held in Seattle.

**May**

May 6, 1999 Final environmental advisory issued.

May 26, 1999 Presentation to Snohomish High School on environmental advisory.

## **Table 1**

### **Boatyard Survey Results**

<b>QUESTION</b>	<b>YES</b>	<b>NO</b>
Are you more familiar with the requirements in the new permit than the old 1992 version?	27	1 Same - 3
Do you have an increased understanding of sampling methodology and monitoring requirements?	30	1
Was a new stormwater sampling location established?	11	20
Have you ever heard of green crabs?	26	5
Have you ever heard of zebra mussels?	29	2
Could you identify a green crab?	19	12
Could you identify a zebra mussel?	29	2
Did you attend one of the permit workshops?	23	8
Was the workshop helpful?	22	0
Was the technical assistance visit helpful? Rate 1 to 5*.	26 Rating – 4.4	Didn't get one – 3 Didn't know – 1

\* 1 is poor, 2 is fair, 3 is good, 4 is very good, 5 is excellent

**Table 2**  
**Marina Checklist Data and Survey Results**

QUESTION	PRIVATE MARINAS			PUBLIC MARINAS			ALL MARINAS	
	YES	NO	% YES	YES	NO	% YES		
Was there a fuel dock	49	107	31%	24	10	71%	190	38%
Was fuel self-service	27	20	57%	13	10	57%	70	57%
Were there adsorbant pads	75	19	79%	25	3	89%	122	82%
Were there fire extinguishers	81	8	91%	28	3	90%	120	91%
Were there procedures to prevent overtopping the tanks and vents	35	12	74%	18	4	82%	69	77%
Was there an emergency shut off	43		100%	24		100%		
Was O/O aware that soaps and detergents cannot be used on oil spills	109	23	83%	29	1	97%	162	85%(96%)
Was collection and treatment of bilgewater provided	18	124	13%	3	28	10%	173	12%
Was the O/O aware of the limitations of enzymatic bilge cleaners	52	78	40%	16	13	55%	159	43%(46%)
Was a facility for managing hazardous waste provided	16	137	10%	8	26	24%	187	13%
If so, was secondary containment provided	11	4	73%	3	4	43%	22	64%
Are orphaned wastes deemed a problem	31	104	23%	10	21	32%	166	25%
Has the facility ever conducted a collection event	6	123	5%	3	26	10%	158	6%
Did the O/O know how wastes qualify as hazardous	77	45	63%	22	4	85%	148	76%
Did the O/O know that PCBs were different than HW	46	62	43%	14	7	67%	129	47%(79%)
Did O/O learned something new about PCBs								42%
Was used oil collected	53	105	34%	24	9	72%	191	40%
Was the oil routinely tested	28	16	64%	18	4	82%	66	70%
Was secondary containment provided	30	13	70%	17	4	81%	64	73%
Is free access to the collection facility provided	24	27	47%	15	9	58%	75	52%
Is oil from commercial sources collected	6	46	12%	8	14	36%	74	19%
What was the average gallonage of oil collected annually	506			2075			954	

**Table 2**  
**Marina Checklist Data and Survey Results**

QUESTION	PRIVATE MARINAS			PUBLIC MARINAS			ALL MARINAS	
	YES	NO	% YES	YES	NO	% YES		
Did O/O know about the Contingency Fund	14	85	14%	11	17	39%	127	20%(50%)
Did O/O learn something new about used oil recycling								42%
Were pumpout facilities provided	65	91	42%	26	7	79%	189	48%
Portapotty	15			9				
Dumpstation	10			6				
Barge	2			2				
Sewer/pumpout	35			14				
Were shore-based facilities provided	112	32	78%	30	1	97%	175	81%
Restroom	83			19			102	
Laundry	26			5			31	
Shower	52			16			68	
Was there a procedure to assure live-a-boards use pumpout facilities	45	59	43%	6	16	27%	126	40%
Was the O/O aware of the Parks grant program for construction of pumpouts	77	48	62%	27	4	87%	156	67%(98%)
Was the O/O aware of the major causes of shellfish bed closures	72	57	56%	20	10	67%	159	58%(81%)
Was there a procedure to prevent the discharge of greywater	22	105	17%	6	21	22%	154	18%
Were pet wastes managed	89	40	69%	18	10	64%	157	68%
Were spill response materials provided	97	54	64%	30	3	91%	184	69%
Was free access provided	48	55	47%	17	12	59%	132	49%
Was spill training provided to staff	74	69	52%	25	5	83%	173	57%
Were spill notification numbers provided	86	49	64%	28	3	90%	166	69%(81%)
Is O/O more prepared to respond to a spill								68%
Had the O/O ever heard of Zebra mussels	89	50	64%	19	7	73%	165	65%(90%)
Can the O/O identify one	62	70	47%	12	14	46%	158	47%(79%)

## **Table 2**

### **Marina Checklist Data and Survey Results**

QUESTION	PRIVATE MARINAS			PUBLIC MARINAS			ALL MARINAS	
	YES	NO	% YES	YES	NO	% YES		
Did the O/O know the environmental and economic impacts	71	65	52%	10	12	45%	158	51%
Which of the following was recycled								
Aluminum	78	#1		18	#1			
Cardboard	64	#2		17	#2			
Glass	55	#3		13	#3			
Paper	47	#4		9	#4			
Tin, Zinc, and Bronze	31	#5		7	#5			
Plastic	27	#6		5	#6			
Did the O/O read any portion of the manual								92%
Did O/O find the manual useful								98%
Did O/O find on-site visit useful								94%
Did you make any changes in the operatoion of your marina as a result of the manual or site visit?								69%

Data represents the respnses from 195 marinas throughout the state. Survey results are in parentheses and represent 27% of the marinas visited.

### **Table 3**

## **Marina Survey Results**

<b>QUESTION</b>	<b>YES</b>	<b>NO</b>
Did you learn anything new about hazardous waste management?	27	25
Did you learn anything new about used oil recycling?	22	31
Are you familiar with the Contingency Fund?	26	26
Did you learn anything new about PCBs?	22	30
Do you know that PCBs are regulated separately from hazardous wastes?	41	11
Have you heard of green crabs?	46	7
Have you heard of zebra mussels?	48	5
Could you identify a green crab?	31	21
Could you identify a zebra mussel?	41	11
Are you more prepared to handle a spill in your marina?	36	17
Are spill notification numbers posted or accessible?	42	10
Are you aware that soaps and detergents should not be used to disperse oil spills?	51	2
Do you know why enzymatic bilge cleaners do not work effectively?	24	28
Are you aware of the State Parks grant program for the construction of pumpout facilities?	51	1
Are you aware of a major cause of shellfish bed closures?	42	10
Did you read any portion of the manual or refer to it?	48	4
Did you find the manual useful; Rate 1 to 5*?	49 Rating - 4.1	1 N/A 3
Was the on-site visit useful; Rate 1 to 5?	49 Rating - 4.1	4
Did you make any changes in the operation of your marina as a result of the manual or site visit?	36	16

\* 1 is poor, 2 is fair, 3 is good, 4 is very good, 5 is excellent

**Table 4**  
**Bottom Paint Lifecycle Analysis**

<b>Manufacturer</b>	Interlux	Interlux	Woolsey	Petit
<b>Paint Brand</b>	Redhand	BottomKote	Premium Performance	ACP-50
<b>Paint Type</b>	Sloughing	Sloughing	Ablative	Ablative
Haulout Costs	\$185	\$185	\$185	\$185
Yard Storage Costs	\$50*	\$50*	\$75	\$75
Preparation Costs	\$100*	\$100*	\$1,000	\$1,000
Paint Costs	\$240	\$240	\$240	\$660
<b>TOTAL</b>	<b>\$575</b>	<b>\$575</b>	<b>\$1,475</b>	<b>\$1,925</b>
Price per gallon	\$80	\$120	\$120	\$220
In-Water Hull Cleaning Costs	N/A	N/A	N/A	N/A
Life Span/Year	1	1	3	4
Costs/Year	\$575	\$575	\$490	\$480
Copper Content	21% CuO	43% CuO	40% CuO	47% CuO
Copper Released/Year	9.5 pounds	13 pounds	4 pounds	5.3 pounds

## **Table 4**

### **Bottom Paint Lifecycle Analysis**

<b>Manufacturer</b>	Interlux	Sound Specialty Coatings	American Marine Coatings
<b>Paint Brand</b>	Veridian	Aquaply M	Copperpoxy
<b>Paint Type</b>	Silicone	Epoxy	Metallic
Haulout Costs	\$185	\$185	\$185
Yard Storage Costs	\$75	\$75	\$75
Preparation Costs	\$1,000	\$1,000	\$1,000
Paint Costs	\$700	\$600	\$675
<b>TOTAL</b>	<b>\$2,000</b>	<b>\$1,900</b>	<b>\$1,950</b>
Price per gallon	\$350	\$200	\$225
In-Water Hull Cleaning Costs	\$750	\$1,500	\$1,500
Life Span/Year	5	10	10
Costs/Year	\$540**	\$340	\$345
Copper Content	No Copper	No Copper	60% Cu
Copper Released/Year	None	None	3.6 pounds

\* Hull preparation and yard storage costs reduced because less preparation would be necessary.

\*\* Significant cost savings can be realized from increased fuel efficiency.

# **Attachment A – Draft Environmental Advisory**



STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

PO. Box 47600 • Olympia, Washington 98504-7600  
(360) 407-6000 • TDD Only (Hearing Impaired) (360) 407-6006

March 6, 1998

Dear Commercial Divers and Interested Parties:

In August of 1997, Ecology proposed to cover commercial divers conducting in-water hull cleaning under the provisions of the draft General Boatyard permit. However, the written responses and oral testimony received from the general public during the official public comment period opposed Ecology's proposal to extend coverage to commercial divers. Based on the comments received, Ecology is withdrawing its support of in-water hull cleaning and is issuing a draft advisory against the practice. A copy of the draft advisory is enclosed for your information.

Ecology is interested in receiving comments from commercial divers and other interested parties regarding our approach. We would particularly like to review any data or new information on the environmental impacts of in-water hull cleaning that was not available to us when we developed this draft advisory. Therefore, we are opening a thirty (30) day comment period in which to receive this new information. Your input is critical to the development of the final advisory. If you do not comment, the advisory will be distributed in its current form. All comments should be submitted to:

Paul Stasch  
Water Quality Program  
Washington State Department of Ecology  
P.O. Box 47600  
Olympia, WA 98504-7600  
Telephone: (360) 407-6446  
FAX: (360) 407-6426

Sincerely,

A handwritten signature in cursive script that reads "Paul Stasch".

Paul Stasch  
Technical Specialist  
Water Quality Program

PS:pc

**Draft**  
**STATEMENT OF BASIS**

The Washington State Department of Ecology (Ecology) and Department of Natural Resources (DNR) do not condone or support the in-water hull cleaning of vessels by commercial divers in either marine or fresh waters of the state. It is believed that the wastestream generated by commercial divers constitute point source discharges of pollutants to waters of the state. As point source discharges, any industrial or commercial operations with a point source discharge need a National Pollution Discharge Elimination System (NPDES) permit, administered by the Environmental Protection Agency (EPA), under the provisions of the Federal Clean Water Act. The EPA has delegated this permitting authority to Ecology. Ecology has been authorized to implement this wastewater discharge permit program by the state legislature through the provisions of Chapter 90.48 RCW, Water Pollution Control Act; and its enabling regulations, Chapter 173-220 WAC, National Pollutant Discharge Elimination System Permit Program, and Chapter 173-226 WAC, Waste Discharge General Permit Program.

The available data documents that the copper concentrations in surface waters surrounding a vessel's hull cleaned by commercial divers are elevated. A report published by the California Regional Water Quality Control Board, entitled, The Effect of Copper-based Antifoulant Paints on Water Quality in Recreational Boat Marinas in San Diego and Mission Bays, documented copper concentrations of up to 83 µg/L during in-water hull cleaning. Elevated copper levels existed near the surface and at a depth of 12 feet. A discrete plume of contamination was documented to drift from the site.

Ecology's own data documents elevated copper concentrations in surface waters during in-water hull cleaning. In 1992, a vessel painted with a Trident brand sloughing paint being cleaned at the Poulsbo Yacht Club, resulted in copper concentrations of 648 µg/L in the waters adjacent to the vessel. In 1994, a vessel painted with a non-ablative hard vinyl paint being cleaned at the Elliot Bay Marine, resulted in total recoverable copper concentrations of 590 µg/L in the waters adjacent to the vessel.

The anti-fouling paints used to coat the hulls of vessels contain toxic metals such as copper, tin and lead-based compounds. Chapter 173-201A WAC, Surface Water Quality Standards establishes numeric criteria for metal pollutants for both marine and fresh waters. The water quality standard for copper in marine waters is less than 5 parts per billion. The data presented above indicate that in-water hull cleaning elevates the copper concentrations in surface waters above this standard. With this information, Ecology is prevented by law from issuing an NPDES permit to a person or persons whose discharge will violate the water quality standard for copper. A person or persons who discharge without a permit or whose actions violate water quality-based standards are subject to the enforcement provisions of Chapter 90.48 RCW, Water Pollution Control Act.

The water quality standards have been developed to protect the beneficial uses of surface waters. Aquatic resources are one of those uses being protected. The anti-fouling paints used to coat the hulls of many vessels are specifically designed to deter the attachment of aquatic organisms. However, the copper compounds used in the paints are highly toxic to non-target organisms as well as resulting in both acute (lethal) and chronic (sub-lethal) effects. The chronic effects can result in anatomical abnormalities, growth and reproduction effects, and bioaccumulation.

Commercial boatyards in the State of Washington must receive a General NPDES Boatyard permit prior to initiating operations. This permit prohibits the direct discharge of any hull cleaning wastewater to surface water of the state and requires boatyards to install pressure wash wastewater collection systems. RCW 90.48.010, RCW 90.52.040 and RCW 90.54.020 require the use of all known, available and reasonable treatment (AKART) to prevent and control the pollution of waters of the state. Ecology has determined that AKART for pressure wash wastewater is evaporation, recycling or discharge to a municipal sanitary sewer. This is known as a technology-based limitation. Commercial divers are unable to provide for the collection and treatment of hull cleaning wastewater and, therefore, cannot comply with AKART requirements. Ecology cannot issue an NPDES permit to a discharger who does not apply technology-based standards. A person or persons who discharge without a permit or violate technology-based standards are subject to the enforcement provisions of Chapter 90.48 RCW, Water Pollution Control Act.

In addition to protecting water quality, the State of Washington has an interest in protecting the sediment quality of state-owned aquatic lands. DNR is the state agency responsible for managing aquatic lands. Many boatyards, port districts and marinas lease aquatic lands from DNR. There is a significant potential for sediment contamination of these leased lands as a result of in-water hull cleaning. Chapter 173-204 WAC, Sediment Management Standards, establishes a sediment quality standard for copper of 390 mg/kg. The practice of in-water hull cleaning is not protective of sediment quality. Contamination of sediments above this standard could make the state, port district, boatyard and marina owners/operators all jointly liable for cleanup and remediation costs.



STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

*PO. Box 47600 • Olympia, Washington 98504-7600  
(360) 407-6000 • TDD Only (Hearing Impaired) (360) 407-6006*

**Draft  
ENVIRONMENTAL  
ADVISORY**

The Washington State Department of Ecology (Ecology) and Department of Natural Resources (DNR) do not condone or support the in-water hull cleaning of vessels by commercial divers in either marine or fresh waters of the state. It is believed that the wastestream generated by commercial divers constitute point source discharges of pollutants to waters of the state. As point source discharges, divers would need to apply for and receive a National Pollution Discharge Elimination System (NPDES) permit for these commercial operations from Ecology.

The anti-fouling paints used to coat the hulls of vessels contain toxic metals such as copper, tin and lead-based compounds. The available data indicate that the wastestream generated during in-water hull cleaning violates the water quality standard for copper. The water quality standard for copper in marine waters is less than 5 parts per billion. The freshwater standard for copper is also in the low parts per billion although it varies with the hardness of the receiving water. With this information, Ecology cannot issue an NPDES permit to a discharger whose discharge will violate the water quality standard for copper. A person or persons who discharge without a permit are subject to the enforcement provisions of Chapter 90.48 RCW, Water Pollution Control Act.

The water quality standards have been developed to protect the beneficial uses of surface waters. Aquatic resources are one of those uses being protected. The anti-fouling paints on the hulls of vessels are specifically designed to deter the attachment of aquatic organisms. However, the copper and other metal compounds used in the paints are highly toxic to non-target organisms, as well, resulting in both acute (lethal) and chronic (sub-lethal) effects. The chronic effects can result in anatomical abnormalities, growth and reproduction effects, and bioaccumulation. A person or persons who violate water quality standards are subject to the enforcement provisions of the Water Pollution Control Act.

In addition to protecting water quality, the State of Washington has an interest in protecting the sediment quality of state-owned aquatic lands. DNR is the state agency responsible for managing aquatic lands. Many boatyards, port districts and marinas lease aquatic lands from DNR. There is a significant potential for sediment contamination of these leased lands as a result of in-water hull cleaning. The sediment quality standard for copper is 390 mg/kg. Contamination of sediments above this standard could make the state, port district, and boatyard and marina owners/operators all jointly liable for cleanup and remediation costs.

Megan White, PE, Manager  
Water Quality Program  
Department of Ecology

Maria Victoria Peeler  
Division Manager  
Aquatic Resources Division  
Department of Natural Resources

# **Attachment B – Final Environmental Advisory**

---



STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

*P.O. Box 47600 • Olympia, Washington 98504-7600  
(360) 407-6000 • TDD Only (Hearing Impaired) (360) 407-6006*

May 5, 1999

Dear Interested Party,

On March 11, 1998, the Washington State Departments of Ecology and Natural Resources jointly issued a draft Environmental Advisory regarding commercial in-water hull cleaning and opened a four-week public comment period. The comment period was extended an additional six weeks because of the large volume of comments received.

Based on the extensive public comment received, the initial draft of the Advisory has been modified to allow the in-water cleaning of vessels painted with hard conventional type paints such as epoxies and vinyls and those not painted with antifouling paints. This approach represented a reasonable compromise given the lack of certainty regarding the leach rates of copper out of the hard antifouling bottom paints when cleaned in-water.

In-water hull cleaning can have significant environmental impacts to both the sediment quality and the water quality within a marina, and those commercial divers violating the provisions of the Advisory could subject themselves to enforcement. It is our hope that by issuing the Advisory in final form, commercial divers can assist boat owners to choose the more durable paints and environmentally friendly coatings.

Questions regarding this Advisory can be directed to Paul Stasch of the Department of Ecology at (360) 407-6446. Specific questions relating to sediment impacts and associated liabilities can be directed to Tamara Allen of the Department of Natural Resources at (360) 902-1068.

Sincerely,

Paul Stasch  
Water Quality Program

PS:pc



WASHINGTON STATE  
DEPARTMENT OF  
**E C O L O G Y**



WASHINGTON STATE DEPARTMENT OF  
**Natural Resources**

**ENVIRONMENTAL  
ADVISORY**  
April 28, 1999

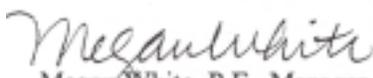
Wastes generated by commercial divers when conducting in-water hull cleaning constitute point source discharge of pollutants to waters of the state. As point source discharges, divers would need to apply for and receive a National Pollutant Discharge Elimination System (NPDES) permit from Ecology. Ecology cannot issue an NPDES permit to a discharger whose discharge will violate the water quality standard for copper. A person or persons who discharge without a permit may be subject to the enforcement provisions of Chapter 90.48 RCW, Water Pollution Control Act. Consequently;

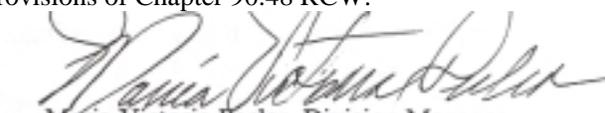
**The Washington State Departments of Ecology (Ecology) and Natural Resources (DNR) have determined the cleaning, by commercial divers, of vessels (as defined by federal regulation) painted with sloughing and ablative anti-fouling paints, and those vessels painted with tin-based compounds while the vessel is afloat is prohibited by state law. The use of mechanical or hydraulic devices for in-water hull cleaning and the manual scraping of hard growth off surfaces painted with anti-foulants is also prohibited.**

The anti-fouling paints contain toxic metals such as copper, tin, and lead. The available data indicate that the wastestream generated during in-water hull cleaning violates the water quality standard for copper. The water quality standard for copper in marine waters is less than 5 parts per billion. The freshwater standard for copper is also in the low parts per billion although it varies with the hardness of the receiving water.

The standards have been developed to protect the beneficial uses of surface waters. Aquatic resources are one of those uses being protected. Anti-fouling paints are specifically designed to deter the attachment of aquatic organisms. However, the copper and other metals used in the paints are highly toxic to non-target organisms as well, resulting in both acute (lethal) and chronic (sub-lethal) effects. The chronic effects can result in anatomical abnormalities, growth and reproduction effects, and bioaccumulation. A person or persons who violate water quality standards may be subject to the enforcement provisions of Chapter 90.48 RCW.

In addition to protecting water quality, the state of Washington has an interest in protecting sediment quality and the general health of aquatic lands, as provided by Chapter 79.01 RCW, Public Lands Act and Chapter 79.90 RCW, Aquatic Lands Act. DNR is the state agency responsible for managing state-owned aquatic lands and protecting their beneficial uses. DNR's programs are implemented to minimize and, where possible, eliminate impacts to sediments and other aquatic resources. Because there is a significant potential for exceedances of the sediment quality standard for copper as a result of in-water hull cleaning, this activity is inconsistent with DNR's management responsibilities. The sediment quality standard for copper is 390 mg/kg, dry weight. Be aware that the contamination of sediments above this standard could make the state, port districts, boatyards marinas, and commercial divers all jointly liable for cleanup and natural resource damage costs; and may be subject to the enforcement provisions of Chapter 90.48 RCW.

  
Megan White, P.E., Manager  
Water Quality Program  
Department of Ecology

  
Maria Victoria Peeler, Division Manager  
Aquatic Resources Division  
Department of Natural Resources



WASHINGTON STATE DEPARTMENT OF  
**Natural Resources**

**STATEMENT OF BASIS,  
April 28, 1999**

**Introduction**

This Statement of Basis is designed to provide a more detailed justification for the Environmental Advisory, issued March 11, 1999, about the practice of commercial in-water hull cleaning. The Statement of Basis is intended to document both the legal and technical rationale for its issuance. Furthermore, it summarizes the comments received on the draft advisory during the public comment period.

**Determination**

Wastes generated by commercial divers when conducting in-water hull cleaning constitute point source discharges of pollutants to waters of the state. As point source discharges, any industrial or commercial operations with a point source discharge need a National Pollutant Discharge Elimination System (NPDES) permit, administered by the Environmental Protection Agency (EPA), under the provisions of the Federal Clean Water Act. The EPA has delegated this permitting authority to Ecology. Ecology has been authorized to implement this wastewater discharge permit program by the state legislature through the provisions of Chapter 90.48 RCW, Water Pollution Control Act; and its enabling regulations, Chapter 173-220 WAC, National Pollutant Discharge Elimination System Permit Program, and Chapter 173-226 WAC, Waste Discharge General Permit Program. Ecology cannot issue an NPDES permit to a discharger whose discharge will violate the water quality standard for copper. A person or persons who discharge without a permit may be subject to the enforcement provisions of Chapter 90.48 RCW, Water Pollution Control Act. Consequently;

The Washington State Departments of Ecology (Ecology) and Natural Resources (DNR) have determined the cleaning, by commercial divers, of vessels (as defined by federal regulation) painted with sloughing and ablative anti-fouling paints, and those vessels painted with tin-based compounds while the vessel is afloat is prohibited by state law. The use of mechanical or hydraulic devices for in-water hull cleaning and the manual scraping of hard growth off surfaces painted with anti-foulants is also prohibited.

Sloughing and ablative paints are often-referred to as "soft" paints. These paints are soluble and expose new layers of biocide as the outer layers of paint dissolve in the water. It is incumbent upon divers to ensure the vessel they are cleaning is not painted with a sloughing or ablative paint. In addition to visual observation, divers must consult the boat owner as to the type of bottom paint on the vessel and document their efforts. Some examples of soft paints include: Interlux - Red Hand, Bottomkote, Micron CSC; Petit - ACP-50, Yacht Copper, Innovative Marine Coatings - ShipBottom; Woolsey - Neptune II; and U.S. Paint - AWLSTAR Gold Label.

*While vessels painted with soft paints cannot be cleaned in-water, this advisory does not restrict the use of soft paints in any way, nor does it restrict in-water hull maintenance such as propeller, rudder, or prop shaft repair and hull surveys following charter service. Sacrificial anode or zinc replacement is allowed provided the worn zincs are recycled.*

### **Justification**

The available data documents that the copper concentrations in surface waters surrounding a vessel's hull cleaned by commercial divers are elevated. A report published in April 1995 by the California Regional Water Quality Control Board, entitled, The Effect of Copper-based Antifouling Paints on Water Quality in Recreational Boat Marinas in San Diego and Mission Bays, documented copper concentrations of up to 83 parts per billion during in-water hull cleaning. Elevated copper levels existed near the surface and at a depth of 12 feet. A discrete plume of contamination was documented to drift from the site. Unfortunately, this report did not document the type of paint of the vessel being cleaned.

Ecology's data documents elevated copper concentrations in surface waters during in-water hull cleaning. In 1992, a vessel painted with a Trident brand sloughing paint being cleaned at the Poulsbo Yacht Club, resulted in copper concentrations of 648 parts per billion in the waters adjacent to the vessel. In 1994, a vessel painted with a non-ablative hard vinyl paint being cleaned at the Elliot Bay Marine, resulted in total recoverable copper concentrations of 590 parts per billion in the waters adjacent to the vessel.

The anti-fouling paints used to coat the hulls of vessels contain toxic metals such as copper, tin, and lead-based compounds. Chapter 173-201A WAC, Surface Water Quality Standards establishes numeric criteria for metal pollutants for both marine and fresh waters. The water quality standard for copper in marine waters is less than 5 parts per billion. The data presented above indicate that in-water hull cleaning elevates the copper concentrations in surface waters above this standard. With this information, Ecology is prevented by law from issuing an NPDES permit to a person or persons whose discharge will violate the water quality standard for copper. A person or persons who discharge without a permit or violate water quality-based standards may be subject to the enforcement provisions of Chapter 90.48 RCW, Water Pollution Control Act.

The water quality standards have been developed to protect the beneficial uses of surface waters. Aquatic resources are one of those uses being protected. The anti-fouling paints used to coat the hulls of many vessels are specifically designed to deter the attachment of aquatic organisms. However, the copper compounds used in the paints are highly toxic to non-target organisms as well, resulting in both acute (lethal) and chronic (sub-lethal) effects. The chronic effects can result in anatomical abnormalities, growth and reproduction effects, and bioaccumulation.

The potential listing of Puget Sound Chinook salmon and other salmonids under the Federal Endangered Species Act has given impetus to the state of Washington to be more "protective of our salmon resources. Lethal effects (96 hour LC50) on salmonids

frequently occur at about 100 parts per billion. This means that in water with a copper concentration of 100 parts per billion, half of the exposed test organisms would die within 96 hours. R. Eisler's publication in 1998, Cooper Hazards to Fish Wildlife and Invertebrates: a Synopatic Review. Biological Science Report USGS/BRD/BSR – 1997-0002, documents actual LC50 toxicity data on Chinook salmon as low as 10 parts per billion. EPA has established a "level of concern" for endangered and threatened fish when the concentration of a contaminant exceeds 1/20 of the its respective LC50. When considering Eisler's toxicity data, copper concentrations in surface waters above 0.5 parts per billion could be above this level of concern.

Commercial boatyards in Washington State must receive a General NPDES Boatyard permit prior to initiating operations. This permit prohibits the direct discharge of any hull cleaning wastewater to surface waters of the state and requires boatyards to install pressure wash wastewater collection systems. RCW 90.48.010, RCW 90.52.040, and RCW 90.54.020 require the use of all known, available and reasonable treatment (AKART) to prevent and control the pollution of waters of the state. Ecology has determined that AKART for pressure wash wastewater is evaporation, recycling, or discharge to a municipal sanitary sewer. This is known, as a technology-based limitation. Commercial diver's are unable to provide for the collection and treatment of hull cleaning wastewater and, therefore, cannot comply with AKART requirements. Ecology cannot issue an NPDES permit to a discharger who does not apply technology-based standards. A person or persons who discharge without a permit or violate technology-based standards may be subject to the enforcement provisions of Chapter 90.48 RCW, Water Pollution Control Act.

In addition to the adverse impacts to water quality and aquatic organisms, there is a significant potential for impacts to sediment quality as a result of in-water hull cleaning. Chapter 173-204 WAC, Sediment Management Standards, defines a sediment quality standard for copper of 390 parts per million, dry weight. Sediments with concentrations above this standard are designated as having adverse effects on biological resources or posing significant human health threats. The practice of in-water hull cleaning can lead to exceedances of the sediment management standards and is therefore, not protective of sediment quality.

DNR is the state agency responsible for managing state-owned aquatic lands under the provisions of Chapter 332-30 WAC, Aquatic Lands Management. As defined by the legislature, DNR has a responsibility to preserve and restore state-owned aquatic lands for the continued health of aquatic resources. DNR implements its programs to minimize and, where possible, eliminate impacts to valuable aquatic resources such as sediments. This includes placing operational conditions on leases with port districts, boatyards, marinas, and other facilities. If contamination of sediments above standards occurs, the state, port district, boatyards, marinas, and commercial divers could all be jointly liable for cleanup and natural resource damage costs; and may be subject to the enforcement provisions of Chapter 90.48 RCW.

### **Responsiveness Summary**

The draft Environmental Advisory was issued on March 6, 1998. A public comment period was opened through April 15, 1998. Due to the number of written comments being submitted at the close of the public comment period, Ecology continued to accept comments through mid-June. In addition to the large number of responses from the general public, Ecology received 17 separate legislative inquiries from state Senators and Representatives and an inquiry from the Governor's office. A total of 383 written responses were received, 146 were submitted by people identifying themselves as boat owners, 21 from commercial divers, and 3 from permitted boatyards.

Ninety-four percent of the commentators did not support the advisory as written. The commentators provided no water quality data and little new information. Responses received during the public comment period were loosely grouped together by category. The following categories are ranked by descending order of frequency, with the number of responses provided in the parentheses:

- Clean up something else first (104).
- Based on bad science (103).
- Economic hardship for boat owners (101).
- Driven by boatyard' economic interest (75).
- Issue permits to commercial divers (38).
- Some in-water cleaning is acceptable (28).
- Commercial divers will lose their jobs (23).
- Dirty boats use more fuel (21).
- Regulate paints not divers (12).

Based on the comments and a review of the existing data, the draft advisory was modified to allow the in-water cleaning of vessels not painted with an anti-fouling paint and those vessels painted with hard copper-bearing epoxy and vinyl formulations.

# **Attachment C – Used Oil Interim Policy**

---

## Stasch, Paul

---

**From:** Sachet, Jim  
**Sent:** Tuesday, January 19, 1999 8:41 AM  
**To:** Stasch, Paul  
**Subject:** FW: Used Oil Interim Policy

Paul - here's the interim policy that was published in the State Register. It is not very useful or enforceable. Primary reason is that we're caught in that rule making by policy box.

I'll be taking policy to my peers in HWTR to try and crowbar out useable definitions and standards (these already exist in the form of draft rule language). Basically, regional offices need something to provide to facilities like Port of PT so they have a target to shoot for - what can or cannot be managed as used oil, what equipment/structures/record-keeping needs to be installed or implemented, what waste streams are still subject to designation (e.g., sludges, bilge water-treatment sludges).

You can share this interim policy, but please also say that additional clarification is needed to make it useable. Jim

### -Original Message-

**From:** Loranger, Thomas J.  
**Sent:** Friday, October 23, 1998 4:24 PM  
**To:** Cusack, Thomas M.; Mainz, Vern; Kuntz, Miles M.; Sachet, Jim; Rozmyn, Lisa; Kmet, Nancy; Langley, Angela; Wigfield, Kim; Nightingale, Dave; Geier, Judy; Wavada, James V.; Matthews, Chuck; Drumright, Mike; Giglio, David; Lenssen, Gerald D.; Zehm, Polly; Johnson, Harry; Hohmann, David; Boller, Jack (EPA); Dick, Brian R.; O'Neill, Hugh; Malm, James L.; Brydsen, Janice E.; French, Gerald; Rushing, Nicky  
**Cc:** Morrill, Tom (ATG); Thomas, Tyrone; Hewitt, Lorie L.; Sorlie, Greg; 'alice chapman'; 'rick volpel'; 'kevin schanilec'  
**Subject:** Used Oil Interim Policy

Here attached is a copy of the interim policy for materials containing and contaminated with used oil that was delivered for publication today as a miscellaneous publication in the state register.

You will notice that this version is simpler than the draft that went out for review. It seems that when I expand language to attempt to clarify it often creates more confusion. At this rate the final used oil rule will simply say "Manage used oil good!" (that's a joke of course!).

The draft policy generated some great comments from used oil processors and others, which will be very helpful for developing rule language and preamble.

Upon AG advisement this policy is scaled back a bit in breadth to ensure we are not creating in policy what should be created in rule (e.g. establishing a storage limit at processors should have a basis in rule).

I discussed the comments on the interim policy with the implementation network last week and there was general agreement that we are on track with prohibiting the burning of metal working fluids with chlorinated paraffin's as used oil, however, we need to discuss alternative recycling options for these fluids with industry representatives as part of the metal fabricators/machine shop sector initiative.

I'm developing some rule and preamble language and I'll send it out for your review in a few weeks. tl

**August17th interim  
policy on...**



## **Notice of interim policy on materials containing used oil that can be managed as used oil**

### **Background on interim policy**

Ecology is issuing this interim policy to describe the materials containing or contaminated with used oil that can be managed as used oil in Washington. Additionally, this notice describes other changes that will be coming with adoption of the federal used oil management standards (UOMS). The UOMS will be proposed in 1999 and adopted in 1999 or 2000.

Washington presently has standards for used oil burners and marketers in Chapter 173-303 WAC. In addition to standards for burners and marketers, the UOMS will establish comprehensive management standards for transporters, generators, collection centers, and processors/rerefiners of used oil.

### **Materials containing used oil that can be managed as used oil**

An integral part of the UOMS are the applicability statements of 40 CFR part 279.10. These statements address what materials containing or contaminated with used oil can be managed as used oil. At present, Chapter 173-303 WAC, which houses Washington's used oil regulations for burners and marketers does not have applicability statements similar to the applicability statements of 40 CFR Part 279.10. Consequently, it is difficult to determine what materials containing or contaminated with used oil can and cannot be managed as used oil in Washington. This interim policy clarifies what materials can and cannot be managed as used oil in Washington with a list of examples of materials. It is Ecology's expectation that this policy will be consistent with the application of the UOMS when they are proposed in 1999.

With the UOMS proposal, Ecology will continue to communicate the message to generators that wastes and products should not be mixed with used oil. Wastes streams should be segregated and managed separately. Ecology acknowledges, however, that materials do become contaminated with used oil through normal use of the oil.

Most materials that are not dangerous waste and that contain or are otherwise contaminated with used oil in recoverable quantities can be managed as used oil. The following list gives examples of materials contaminated with used oil that can be managed as used oil under this interim policy and following adoption, under the UOMS.

- Oil filters with oil
- Cellulose or nonhalogenated organic polymer sorbents contaminated with oil from spill cleanups
- Used oil mixed with soil when the oil is recoverable
- Recovered oil/water/solid mixtures from oil water separators
- Tank rinse-water and wash-water with recoverable used oil
- Bilge-water with used oil
- Solvent contaminated with used oil *when the solvent before and after use is not dangerous waste (Ecology strongly encourages recycling of these solvent waste streams on-site or through a solvent recycler)*
- Sump clean-out water with recoverable used oil

### **Revisions to the UOMS that will be proposed in 1999.**

Ecology will be proposing only a few revisions to the UOMS in 1999. The significant revisions are as follows:

#### **Metal working fluids with chlorinated paraffins**

Ecology will clarify the regulatory status of metal working fluids with chlorinated paraffins. These fluids will be able to be managed as used oil under Ecology's proposal when on a pathway for rerefining or reclaiming, however, they will be not be able to be burned for energy recovery under the used oil management standards. Because of the high level of chloride in these fluids, Ecology is concerned about the generation of chlorinated dibenzo-dioxins (CDDs) and chlorinated dibenzo-farans (CDFs) during burning. Ecology believes the burning standards of 40 CFR Part 266 Subpart H (The Boiler and Industrial Furnace Rule) and the incineration requirements of 40 CFR Part 264 provide an appropriate standard of care for the burning of metal working fluids with chlorinated paraffins.

#### **Storage limit at used oil processors**

Ecology will also propose a storage limit for used oil at used oil processors to ensure that used oil is not speculatively accumulated before processing. This is prompted by a concern that in many cases used oil has a hazard equivalent to a dangerous waste and used oil processors have fewer management controls than hazardous waste treatment, storage, and disposal facilities.

#### **Mixing of hazardous waste**

Ecology will clarify that conditionally exempt small quantity generator waste and characteristic and criteria dangerous waste should not be mixed with used oil.

**Department of Ecology staff contact:** Tom Loranger (360) 407-6761

GL:2910

cc: Keli McKay-Means, Ecology SWRO  
Kahle Jennings, Ecology SWRO  
Megan White, Ecology HQ

Mr. Ray Shindler  
6431 54th Ave NW  
Olympia, WA 98502

Mr. Steve Appel  
Washington Farm Bureau  
1011 10<sup>th</sup> Ave., SE  
Olympia, Washington 98507

# **Attachment D – Vacuum Sander Total Cost Assessment**

---

## Dustless Sanding Saves Money and Keeps Water Clean

In 1998, the Washington Department of Ecology, with the assistance of the Puget Soundkeeper Alliance, conducted a pilot project to assess all costs and environmental performance of two different bottom paint removal technologies. This demonstration project was co-sponsored by Mr. Neil Falkenburg of West Bay Marina, in Olympia, Washington. One side of the bottom of the project vessel was prepared with a vacuum sander while the other side was prepared with a traditional air rotary grinder. Then costs were compared.



The purpose of the demonstration was to determine if there were economic incentives to adopting dustless sanding technology in addition to the obvious environmental benefits. The NPDES Boatyard General permit is designed to control the release of pollutants into surface waters. The permit states:

*When stripping, sanding, scraping, grinding, sandblasting, painting, coating and/or varnishing any portion of a vessel, all particles, oils, grits, dusts, flakes, chips, drips, sediments, debris and other solids shall be collected and managed to prevent their release into the environment and entry into waters of the state.*

*Drop cloths, tarpaulins, structures, drapes, shrouding or other protective devices shall be secured around the vessel to collect all such material. The cleanup of all collected materials shall be routinely undertaken to prevent their release into the environment and entry into waters of the state. The use of vacuum sanders is recommended as a means to greatly reduce the amount of particulate released into the environment.*

The cost assessment conducted found boaters using vacuum sanders to prepare the bottom of a 32 foot sailboat for repainting could save \$235 in material costs over the air rotary tool.

The economics are different for the boatyard than for an owner working on his boat. The boatyard must purchase the equipment. The Fein vacuum extractor 9-55-13 costs \$250 and the Fein MSf 636-1 power head costs \$535, for a total system cost of \$785. The material cost savings on this project were \$170. The system could be paid off in as little as five jobs. If the boatyard rented out the equipment at a rate of \$50 per day, the system could be paid for in 16 rental days. If the purchase of the system coincided with the peak work season, the cost of the entire system could be recovered in just over two weeks.

Note: Special thanks are extended to Jeremiah Mitchel for his technical support to this project. Partial funding for this project provided by a Public Participation Grant from the Washington State Department of Ecology.

## Vacuum Sander



- ✓ Need only dust mask and eye protection.
- ✓ Sander safer and comfortable to use.
- ✓ Need only drop cloth
- ✓ Clean with dust completely contained in filter bag
- ✓ 98% dust-free, certified for lead abatement work.
- ✓ Sanding Pads last longer and plug less.
- ✓ Labor - \$900.
- ✓ Material - \$188 (\$54 for boatyard).
- ✓ Total Costs - \$1088

## Traditional Air Rotary Tool



- ✓ Need respirator and protective coveralls.
- ✓ Safety equipment difficult to work in.
- ✓ Need drop cloth and plastic shrouding.
- ✓ Messy with large volume of solid wastes generated.
- ✓ More paint dust escapes due to positive pressure.
- ✓ Sanding pads gum up rapidly.
- ✓ Labor - \$800.
- ✓ Materials - \$424 (\$224 for boatyard.)
- ✓ Total Costs - \$1224

## Discussion

All work was performed by qualified boatyard personnel and assigned a flat rate of \$50 per hour. Boatyard permit requirements for tarping and shrouding were strictly adhered to. Material costs included duct tape, visqueen, sanding pads, filter bags, safety equipment and rental costs. Standard rental rates were used for equipment and respirator. Time to locate and rent equipment was not included.

Labor costs were similar, but vacuum sanding took slightly longer at 18 hours versus 16 hours. This was attributed to the size difference between the 6" vacuum sander pad and the 8" disc of the air rotary tool. There were significant material savings with the vacuum sander. This was a result of 168 fewer sanding pads gumming up with melted paint from frictional heat and less plastic and tape needed to shroud the vessel, in accordance with permit requirements.

Copper found in bottom paints is a major pollutant in stormwater runoff from boatyards; and a contaminant of marinas. The safe copper levels for our waters are in the low parts per billion while the copper in stormwater is measured in parts per million. The biggest problem is the do-it-yourselfer that walks away from a sanding job and leaves the mess to be blown by the wind or washed away by the rain. It makes no sense to spread the paint dust on the ground only to have to pick it up again. The volume of solid waste generated to contain the mess costs money to collect and dispose of. Vacuum sanders put 98% of the dust immediately into a filter bag, out of the elements and off others boats. Their use will keep your boatyard and marina a cleaner place. Consider the following:

- Prevent the transport of toxic paint dust into our lakes, streams and marine waters now, purchase a vacuum sander for your boatyard or marina.